GENERAL LIBRARY MAR 15 20 UNIVERSITY OF MICHIGAN CHEMICAL LIBRARY

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CXLIX. No. 2963.] LONDON, FEBRUARY 24, 1920. [72ND YEAR. PRICE 8d.

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C. 2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 LONDON WALL.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
SULPHATE OF AMMONIA PLANT
W. NEILL & SON, Ld.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'NEILL, ST. HELENS.' Telephone No. 20.

PURIFYING MATERIAL
"Brownox-de-Luxe."
Unqualified Satisfaction given where used.
SPENT OXIDE PURCHASED
J. BROWN & CO., Ltd.
Savile Town, DEWSBURY.

TORBAY
JOINT STOPPING
FREE FROM LEAD.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

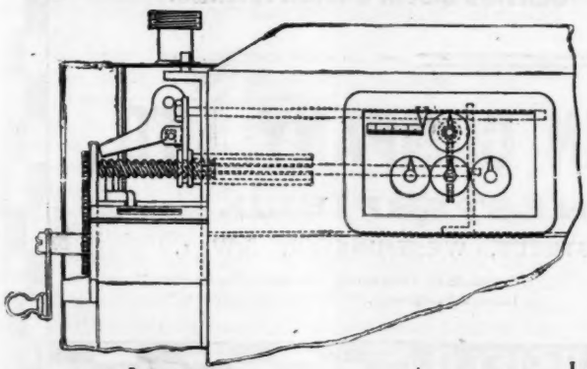
Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.
ASHMORE, BENSON, PEASE & CO., LTD.,
STOCKTON-ON-TEES.
Complete GAS WORKS
London Office:
80, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on page III. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
89, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

GEORGE GLOVER & CO., LTD.,
CHELSEA.



"THE STANDARD"
SLOT METER.
THE ACME OF SIMPLICITY.
NO SPRING in any part of the mechanism.
Can be fitted with **STRONG BOX**, if desired, or with **"M & M" LOCK.**

LONDON:
RANELAGH WORKS, ROYAL AVENUE, CHELSEA, S.W. 3.
TELEPHONE: 1140 Kensington.
WIRE: "Dry Meters, London."

LEEDS:
9, DEWSBURY ROAD.
TELEPHONE: No. 26463.
WIRE: "Meters, Leeds."

MANCHESTER:
GAYTHORN METER WORKS, EASTON STREET.
TELEPHONE: No. 6398 City.
WIRE: "Slot, Manchester."

"FERRODUR" ELASTIC PAINT
Does not blister or "chalk" off.

SOLE MAKERS OF THE "ROTARY" & COAL WASHER.
H. & G. DEWHURST, LTD., CONNAUGHT MANSIONS, 34, VICTORIA STREET, S.W. 1. MANCHESTER.

GRIFFITHS BROS. & CO. (LONDON), LTD. BERMONDSEY, LONDON, S.E. 16.

W 669.

Length overall, 18 in.
Diameter of Reflector, 15 in.

Catalogues and Prices on application.

A LAMP OF DISTINCTIVE VALUE FOR Outdoor GAS LIGHTING

Fitted with 3 Medium Inverted Burners, each arranged with **PRE-HEATED CHAMBER.**

Outside Gas & Air Regulators.

Highly-finished Casing enamelled in dark green.

A Special Feature of this Lamp is that **NO INNER GLASSES** are required.

WELSBACH
OUTDOOR
PRE-HEATED LAMP

BRITISH-MADE

ADVT. OF THE WELSBACH LIGHT CO., LTD., WELSBACH HOUSE, KING'S CROSS, LONDON, W.C. 1

B DONKIN D

DONKIN
for
DISTRICT SERVICE GOVERNORS

HIGH AND LOW PRESSURE SERVICE REGULATORS, METER REGULATORS, STOVE AND LAMP REGULATORS, SERVICE CLAMPS AND FITTINGS.

THE BRYAN DONKIN COMPANY, LTD.,

Head Offices & Works, **CHESTERFIELD.**

LONDON OFFICE: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.

Chesterfield Telephone No. 84.
London Telephone No. 5338 Victoria.

Chesterfield Telegrams, "Donkin, Chesterfield."
London Telegrams, "Donkin, Vic. London."

B CHESTERFIELD D

GAS JOURNAL

LIGHT · HEAT · POWER · BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLIX., No. 2963.] TUESDAY, FEBRUARY 24, 1920. [72ND YEAR.

EDITORIAL NOTES.

Gas Legislation in Embryo—The Coming Relief Bill.

In the allocation of Private Bills between the House of Lords and the House of Commons, it has been arranged that the South Metropolitan and the South Suburban Gas Companies' promotions are to commence their parliamentary journey in the House of Lords. They will be referred to a Committee; and it may be that the Committee will decide not to proceed with the heat-unit and the financial revision sections of the two measures before the General Bill to be promoted by the Board of Trade has been considered by Parliament and passed. Had there been no public measure forthcoming, the situation would have been altogether different; and the two Private Bills would have gone forward on their merits. But we cannot think that, in view of the promised Government Bill, Parliament would agree to privately promoted Bills proceeding—though there is not the slightest objection to the proposals in them; in fact, so far as the heat-unit scheme goes, both are in accordance with the recommendations of the modified Beilby report—until it has given its decision on what is to be submitted to it by the Board of Trade. At the same time, there is nothing whatever (for instance, in connection with financial revision) to prevent the Government or Parliament adopting anything from the South Metropolitan or South Suburban Bill which they might regard as an improvement on their own scheme, if there is a definite scheme in view. We know there is a difference of opinion over the question of the best method of bringing about financial revision. It is agreed by everybody (the subject has been very prominent this last week or two at all gas companies' meetings) that the present position is monstrously unjust to investors in concerns statutorily authorized, and is a very unhealthy one regarded industrially or financially, or from the aspect of reliance on parliamentary protection. Where there is disagreement, it is (as pointed out above) merely as to method. Some people would prefer one or more factors in the sliding-scale to be changed in degree, so as to meet the altered economic conditions; others want to give investors greater assurance that, whatever betides in the future, there will be no crippling of the industry again by the retrogression of dividends and market values of stocks and shares such as we have been experiencing during the last four or five years, and from which the industry is now suffering terribly. Unless we legislate against a recurrence of this sort of thing now that the opportunity offers, the lesson of the present dismal circumstances will have been completely lost. A defect has been discovered; it should be remedied.

It will have been noticed that in the foregoing the remark is made, in connection with financial relief, "if "there is a definite scheme in view." It is quite possible —indeed, it is highly probable—that there is not. The difficulties of framing one that would meet all the conditions of gas companies wherever located are such that, to put definite terms in a General Bill, would produce effects that would be just in some cases but very unjust in others. It is more than likely that when the Bill is introduced, it will be found to be in general terms, which will confer certain powers upon the Board of Trade, with (we should imagine) directions or principles laid down for their guidance. But readers must not take this as being positive, but simply as a warning as to what may happen. It is as well to offer the warning, because, at some meetings during the past week or two, remarks have been made on the subject as though, with the acceptance of the General Bill, the Companies will pass immediately from the state of financial hardship to that of financial relief for existing capital. We are inclined to think this will not be the case, but that the Bill will provide the road by which relief may be secured.

Returning to the two Private Bills (on which a most important report, published in our news columns to-day, has been made to the London County Council), the South Metropolitan Gas Company are proposing quite a new scheme which, it is suggested, should supplant the old sliding-scale, and give the consumers, the proprietors, and the workers a defined interest below a standard price, at which the ordinary capital would be entitled to 6 p.ct. dividend. We dealt with this proposal last week and in former articles. The proposals are quite fair and acceptable. The South Suburban Company, on the other hand, are proposing an amendment of the sliding-scale, with a periodical revision if necessary. During the first five years the Company are willing to bind themselves not to pay a higher dividend than 6 p.ct., which is the suggested standard rate. There are people who strongly object to the uncertainty that a quinquennial revision would bring to bear upon dividend conditions, and thus of market values. The argument that can be raised in favour is that conditions have not reached the end of their metamorphosis; and therefore it will be as well after a period to have a reinvestigation of the question of the standard price. Of course, revision is as good for the Company as for the consumer, because, as the Chairman of the Company (Mr. Charles Hunt) told the proprietors at their meeting last Friday, the periodical revision will ensure that the standard price corresponds for the time being with the cost of manufacture and distribution, other than any increase of the costs due to defective management. "For "the time being!" We are not at all sure about that. It is within the period of five years that there has been the mighty crash that has brought the gas industry where it is to-day. We do not expect such another world upheaval, with all the results of new-born economic conditions, which have made things permanently and infinitely worse for all industries than ever before. Just what we do not expect now, we did not expect before August, 1914. In the revision too, there must be perfect assurance that economies due to the exercise of prudence, foresight, and skill in management are not used to bring down the standard price and the dividends. Evidently Mr. Hunt sees no danger of this, for he says that the standard price of gas will only be altered in regard to any change in working costs over which the Company have no control; while any reduction of such costs attributable to the exercise of due care in management will leave untouched the standard price and the sliding-scale dividends which the Company may be earning. Given the opportunity, we are afraid that local authorities will not be prepared to make any nice discrimination between what is not under the control of the Company, and what is realized by efficiency in management.

It is, of course, well known that the National Gas Council did make representations to the Board of Trade as to the terms of financial revision which, in the opinion of the Council, would be acceptable to the gas industry generally. But there are no grounds for thinking that these terms will be embodied in the Bill which the Board of Trade have now in preparation. The Board will merely consider suggestions, but are not in any way bound to adopt them. Had their proposals (if positive in terms) been known earlier, however, it is quite possible a large part of the Bill of the South Suburban Company would not have been submitted to Parliament. This is gathered from a remark made by Mr. Hunt in connection with his reference to the

terms suggested to the Board of Trade by the National Gas Council. Because it was not known whether these terms would be embodied in the Government Bill, the Directors "felt it desirable they should be reflected in our Bill, "so far as regards the proposed new standard dividend, "new standard price, and the calorific power to be supplied." It will be observed that Mr. Hunt does not say that all that is proposed in the Company's Bill in this connection reflects the suggestions made to the Board of Trade by the National Gas Council; and when the Council are at liberty to speak, it may be found that the plan for periodical revision does not reflect their views, and did not originate with them.

As to the heat-unit scheme, and the selection of a calorific value standard to suit the conditions of each undertaking, with power to change the declared calorific value by complying with the conditions laid down by the Board of Fuel Research, this meets with the entire approval of Mr. Hunt, as does also the plan to charge for gas on the heat unit basis. Acknowledgment is made by him of the work that the National Gas Council did in securing modifications of the Beilby report which make the scheme a "fairly workable "one." But in his view the conditions as a whole are much more onerous than those to which gas undertakings have been accustomed hitherto. We have often spoken of the report as giving more liberty to the industry than the old conditions. And so it does—up to a point. It does away with a stereotyped standard applying to all sorts of antagonistic conditions; and it recognizes that progressive and maximum economy needs change in obligation. Mr. Hunt, however, only refers to one condition that is more onerous. If we were asked what he had in mind besides the condition he referred to, the answer would be a guess, but would be summed up by the word "inerts." The instance he gave of a more onerous condition is the surveillance of liberty by the continuously recording calorimeter. This cannot be avoided. If we are going to sell on a heat basis, then there must be some means of assuring to the consumer a continuity of the declared value. Mr. Hunt was not complaining; he was only pointing to a fact. And at the same time, he acknowledges the advantage to the gas consumer. "Seeing they "are of advantage to the consumer, we are prepared to "carry them out to the best of our ability." That is the right spirit. The advantage to the consumer is in this instance one that will result in advantage to the gas suppliers; and so "all's well that ends well."

Gas Unionists and Non-Unionists.

HAVING worked hard for the greater part of our lives, and generally for considerably more than forty-seven hours a week, there is a natural inclination to take an interest in what other workers are doing. There is strong admiration on our part for our fellow men who work with both hands and brains; but there appear just now to be a number of gas workers who very foolishly decline to allow their brains to operate in an intelligent and healthy manner. There were a large number of men at the North Middlesex Gas-Works who recently voluntarily left their employment because seven of their fellows preferred to exercise their rights as free men, and remain non-unionists. The majority wanted to compel these men to become members of the Union, or as an alternative they asked for their dismissal. The seven men did not suggest that their fellows should leave the Union, or as an alternative be dismissed. The North Middlesex unionists had manifestly wrongly adopted the pre-war Prussian maxim that "Might is right." Because Germany stuck to this stupid notion, the Allies were forced into war with that country, and many British gas workers took part in the fight, and helped to convince Germany that the Prussian dogma had no foundation in fact. The North Middlesex gas workers who went on strike were much in the same position as Germany. They believed that their numbers would prevail, and that they would be invited back on their own terms. They were not asked to strike; their headquarters did not suggest they should strike. They left their employment; and so the Company, having been forsaken by their men, took the commonsense course of filling their places. The strikers were beaten, and now wish to be reinstated. Most beaten people would have been too proud to make such a request. But these men were not. Now we hear of meetings of men belonging to other gas-works at which the question is being discussed as to whether the example of the North Middlesex men shall be followed, and non-unionists compelled to drop the prefix "non," or be dismissed. By doing this, it is also thought by some that pressure would be brought to bear on the North Middlesex Company's Directors to reinstate the self-discharged men, and after all render the non-unionists derelict. It may as well be understood first as last that directors of gas companies are not prepared to abandon a neutral attitude as to whether men join, or abstain from joining, a union. It is not part of the duty of employers to divest any man of his free will in such a matter, nor is it the duty of unionists. The leaders of the union, we do not believe, have any desire for a breach of relations with gas companies over such an issue as this. They appreciate, if all the rank-and-file of the organization do not, that the world was not made only for trade unionists. It was quite intended that other people should also live in it, and be permitted to enjoy their rights and exercise their free will, within the limits defined by moral and civil laws. We would say to those unionist gas workers who are contemplating attempting to dispossess their fellows of the right to exercise their free will—Be men, and respect individual liberty.

The Tale of an Analysis.

THE analysis of the accounts for 1919 of the Metropolitan and Suburban Gas Companies, which Mr. F. J. Bradfield, the Secretary of the Commercial Gas Company, has prepared for publication in our columns to-day, is particularly enlightening. It might have been anticipated by every rational person that, with the end of the war and the return of the skilled coal miners, gas workers, railway and other transport workers, costs would have shown some decline, and working generally an improvement. But the right-hand page of the analysis especially tells a tale at a glance. Actualities mock expectations. The data on that page (representing expenditure) contain few figures printed in dark type which represent decreases; and most of the decreases that there have been are in items that are relatively of minor importance. Speaking generally of the accounts, a cheering feature is found in the increased business in gas—the increases are very remarkable, whether regarded in total volume or percentages—which has had good effect on the capital expenditure per 1000 c.ft.; and there is seen the great obligation that the companies and the consumers are under to residual products. Some of the figures of the Commercial Gas Company are particularly noticeable. The Company is supplying gas at the lowest price of any of the Metropolitan Companies; it makes the largest quantity of gas per ton of coal; and its coal and oil cost less (gross or net); and this, combined with the higher make, results in a substantial difference in cost of manufacturing materials per 1000 c.ft. of gas made. This make by the Company last year averaged 13,442 c.ft. per ton, compared with 12,201 c.ft. for the Gas Light and Coke Company, and 12,275 c.ft. for the South Metropolitan Gas Company. The percentages of water gas used by the Commercial and Gas Light Companies were respectively 26·26 and 23·61. Now that the industry is expecting to be, before long, conducting its business on a heat-unit basis, it would be of considerable interest if Mr. Bradfield could find room to add to his useful analysis authentic figures as to the calorific power of the coal and water gas and of the mixed gases, so as to enable calculation to be made of the heat value put into the gas-mains per ton of coal carbonized. The Company have of late been—we believe completely—their own carriers of coal; and this, with the high make of gas per ton, accounts for the charge for coal, oil, &c., being 31·96d. per 1000 c.ft., compared with 37·38d. for the Gas Light Company, and 40·57d. for the South Metropolitan Company. But what figures these are compared with pre-war days, when gas was being sold by the companies at much below the gross cost of coal to-day, and good dividends were being paid. Residual products, however, served the companies well last year, particularly coke; and these made the net cost of coal, oil, &c., in the case of the Commercial Company 12·97d. per 1000 c.ft. (a reduction compared with 1918 of 5·3d.), in the case of the Gas Light Company 15·97d. (an increase of 0·7d.), and in the case of the South Metropolitan Company 14·88d. (a decrease of 2·04d.). The cost of coal per ton delivered was 36s. 10·91d. for the Commercial Company, 38s. 8·97d. for the Gas Light Company, and 38s. 7·8d. for the South Metropolitan Company—a decrease for the Commercial Company of 0·76d., an increase for the Gas Light Company of 4s. 10·63d., and for the South Metropolitan Company of 3s. 3·99d. We could extract more interesting

figures from these analyses; and if space and time permitted, an instructive comparison could be made with the figures for the year preceding the war. But the cost conditions then existing are dead, and so is the hope that they will ever be brought to life again.

Ideals and Cost Excesses.

IDEALS frequently soar above the practicable; and to the extent that they do so, they are unattainable. The Ideal Home Exhibition closes its doors to-morrow. From the spectacular point of view, it was highly attractive; but, in very large part, it failed to shake into action the public imagination, because what was seen there was in the main something that was beyond the scope of the public pocket. Ideal homes are required for all; but ideal homes are not those that, for instance, purchase labour-saving at an abnormal price. The ideal home for poor and rich alike must be one in which comfort and healthy conditions reign, and in which there can be a saving of labour, but not at extravagant cost. Looking round the exhibition, beauty and luxurious appointments were seen on all sides; and the allurements of labour-saving appliances were there in abundance. There was ample appeal to eye and ear; but the pockets of the greater number of visitors were irresponsive. Crowds went; but largely the verdict of the crowds was that these things were not for them.

Stands and "model" houses were visited in which were seen electric-ovens, electric water-heaters, and electric room heaters. All these things have risen enormously in cost, together with the expense of installation. They were always more costly initially than gas appliances; and with electricity at 2d. to 3d. per unit, their running expense would be prohibitive except to the few. Is the use of these things an "ideal" in economy? They may save labour, but do not save expense. Their use may realize the ideals of men to whom money is of small moment; their extravagance is the antithesis of an ideal to other men. At several stands (notably at that of the South Metropolitan Gas Company, which was one of the chief features of the exhibition, and a marked example of excellent enterprise) there were shown ways and means of attaining labour-saving and cleanliness by means far less expensive than electricity in initial costs, in running expense, and in time. Ideals for the home should embrace and not neglect the factors of money and time savings. But apparently the electricians are of opinion that they should neglect them. Of course, they are in a tight corner in these respects; and, while they talk of labour-saving and cleanliness, they are a little reticent as to the question of cost—to them an unpleasant side of the subject. Test of this was made; and so we know. A small electric-heater was seen which was declared to be the consumer of 1½ units per hour. Supposing the price is only 2d. per unit, this would mean 3d. per hour to get into the room, allowing an efficiency of 100 p.ct., 5130 B.Th.U. per hour. At 4s. 8d. per 1000 c.ft., 3d. would purchase 54 c.ft. of gas from the South Metropolitan Gas Company, which has a heat value of 550 B.Th.U., or somewhat more, per cubic foot. This quantity of gas would develop on combustion not less than 29,700 B.Th.U.; and, at an efficiency of 75 p.c., 22,275 B.Th.U. would be usefully employed in heating a room. To get the same heat into the room as the electric radiator mentioned would only necessitate the consumption of about 12 c.ft. of gas, costing 0·66d. at the 4s. 8d. price. The same points apply to other heating operations, only more so, as the efficiency is lower. The electrical way means extravagance—not ideal economy.

What is the good of talking to the masses of the people of "ideal" conditions which would mean to them waste and the promotion of increased poverty. In such circumstances, "ideal" would be a false description. Yet there are electricians who talk of room and water heating and cooking by electricity in connection with the new housing schemes as though it would make the most delightful and generous contribution to the amenities of the lives of the occupants to pay a price for service rendered by electricity far less efficiently than it can be rendered by other means costing less. The country wants an enormous number of new homes, for people who are not wealthy, but who will for new homes have to pay rents in excess of what they paid before—that is, if the houses are to pay for themselves. It was originally estimated officially that some 500,000 houses were required; now the figure has taken flight to 800,000. There are delays in meeting this demand. What are they? Labour and cost; and it is no use erecting houses that are not going to be weatherproof and durable. By all means let there be labour-saving methods in these houses; but they must be methods that are the most economical. Let those who have extravagant ideals be under no delusions. Those who are going to be tenants of these houses will soon render them tenantless if they find the labour-saving schemes incorporated in them are not on good terms with the limits of their pockets.

Gas and Electrical Men Meet.

THE report is published to-day of what is described as a "debate," between the Midland Junior Gas Association and the South Midland Centre of the Institution of Electrical Engineers, on "The Relative Merits of Gas and Electricity for Heating and Power." "Debate" is a misdescription when applied to a series of statements from the respective points of view of the two sides, with little or no criticism of them. However, reading the report of the statements, we are well satisfied, under all heads, both with the case presented by gas and with that submitted by electricity. We are not with those who pull long faces, and make deprecatory remarks, over any sign of rivalry between the two industries. If there is frank admission that both gas and electricity have their useful places in the world's work and conveniences, then we submit that genuine rivalry has a good stimulating effect, which is of advantage not only to the two industries, but to the community at large. It is also beneficial for a proper understanding to exist, as to the superiorities and otherwise of the competing commodities, among those engaged in furthering the interests of both industries, as nothing but good in the general interests can arise from it. Neither in lighting nor in power can we generalize, and say that one method has all the advantages on its side in respect of economy and utility. For general lighting, gas can always beat electricity in economy; and so it does in quality and distribution. Nevertheless, situation and the consumer's circumstances will largely govern choice. In power, too, the conditions of use will affect selection. Electricity cannot in respect of economy beat gas for a long-hour run, under fairly constant load; but when we come to variable conditions, intermittent use, and scattered small operations, the position is altered. Gas-works, with the utmost impartiality, demonstrate this by using gas as fuel for generating electric current for their intermittent power requirements.

The electricians were from our point of view highly satisfactory, and no doubt fulfilled the expectations of the electrical partizans, by making a very bad showing for electricity's place in coal conservation, compared with that of gas. They only hope for a better state in this respect. The facts as to the actual and foreshadowed position of gas are getting widely known. These facts are unassailable when dealt with in a genuine and intelligent manner, and not in the muddled way of incompetence, of which very pronounced illustrations have been recently given. "Ifs" bristled in the electrical case. "If" this or that could be done; "if" this or that was commercially possible. Electricity supply has been with us forty years. It is not a question of "if" it can be done; the question to-day is, Can it be done? The thermal inefficiency between coal and electrical use cannot be wiped-out by even the maximum thermal efficiency in use; and the electricians know full well (other than those whose comprehension is not equal to simple facts) the weakness of their case in this respect. The "efficiency" of the electric radiator and the oven based on electricity delivered, and not on the coal used at the generating station, make a very poor resistance in the barrier electrically set up against gas progress. Water power is not going to assist electricity much; distribution forms a contra account in the matter. And it would be of no economic or national advantage to try to pack into Scotland all our industries, and all the industrial population of these isles. In the factors making for industrial prosperity, power is only a fragment; and the difference between existing and prospective power costs will not much influence the industrial future. It is all very well to say in connection with coal conservation that electrical men have not set their faces against the carbonization of coal and the recovery of bye-products, and then have to acknowledge in the same breath that this would necessitate the consumption of much more coal per KW.-hour or KW.-year than by using coal directly under steam-boilers. This reminds us that

the excellent experience of large electric generating stations in using the gas-coke and coal "Sandwich" system shows there is no need for them to indulge in the carbonization of more coal. There is another point. Where is there, with all the advances of electrical generation, a power station that, in present circumstances, can afford to supply energy at 0·4d. per KW.-hour, which is the cost mentioned by one electrical speaker as that of using gas (provided by a bituminous producer, with bye-product recovery) in a gas-engine driving electricity generators?

The electricians who took part in the discussion did well to say little about the financial side of electric installation and running, especially in heating operations. The cooking load, being intermittent, is of little use to them; and room heating could not advantageously be taken on to any considerable extent at power prices, because of the fact that it is limited to the winter when the pressure on the generating plants and distribution systems is greatest. It is absurd for electricians to quote percentages of waste for gas and coal that are only true in cases of misuse, and which percentages even then show heat economy compared with the percentage of heat waste that occurs in electrical practice prior to the consumer being reached. All these and other points are well known to our electrical friends; but they are kept lodged away in the background, and outward expression of confidence is largely tempered by the inexpressed knowledge. One thing that the electrical representatives had impressed upon them by the gas representatives is that, good as is the efficiency now of gas production and use, the gas industry is moving to higher efficiencies with a certainty that no verbal statements or exaggeration from the electrical mouth can check.

We congratulate all who took part in the discussion on its excellent tone and spirit; and a word of special acknowledgment to the gas representatives must not be taken by the electrical representatives as showing on our part any inappreciation of their efforts, or of their difficulties, which have not been lessened by the new trend of conditions commenced during wartime, and since greatly developed in robustness.

London County Council and Financial Revision.

Although the London County Council are agreed that the modified Beilby report proposes an advantageous arrangement alike for gas consumers and gas suppliers, it appears that the Public Control Committee are not prepared to accept, without considerable change in terms, the schemes for financial revision that have been published in the Bills of the South Metropolitan and South Suburban Gas Companies. A report on the subject by the Committee reached us yesterday, as final preparations were being made for going to press; but, in view of its importance, we have published it *in extenso* in later columns. The Committee strongly object to piecemeal legislation when the Government have announced an intention to introduce general legislation to deal, by common procedure, with the matter in respect of all gas companies. They also criticize point by point the financial schemes of the two companies. Beyond directing attention to the report, time to-day will not permit us to examine closely the contentions.

Coke for Steam-Raising.

Some interesting particulars of the excellent experience with the use of coke at the Greenwich power station of the London County Council appears in our "Electric Supply Memoranda" to-day. The coke there is applied on the "Sandwich" system—alternate layers of coal and coke; and the success and economy are such that soon there will be twenty boilers working on the system. Eight boilers have been operating on it for some time; and the results obtained with them have justified instructions being given for the conversion of a further twelve.

Air Pollution.

The appointment by Dr. Addison, the Minister of Health, of a Committee to consider the present state of the law in regard to the pollution of the air by smoke and other noxious vapours, and to advise as to the steps desirable and practicable to diminish the evils arising from such pollution, should give an opportunity to the gas industry to present a case for the suppression as far as possible of the combustion of solid fuels which emit smoke, and so cause broadcast pollution. There are men on the Committee who are well known to the gas industry. Among them, apart from the Chairman (Lord Newton), are Prof. Cohen, Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act, Mr. E. D. Simon (of the Manchester City Council), and Bailie W. B. Smith, of Glasgow. Another member, Sir John Lithiby, the late Legal Adviser to the Local Government Board, is interested in gas as a stockholder. It will be remembered that, at the recent meeting of the Brentford Gas Company, he strongly advised action on the part of gas proprietors to help to secure justice in the matter of financial revision.

Nationalization.

This is a subject of which most of us are just about sick; but there has to be close grip of it, as there are certain possibilities associated with it that may mean something rather unpleasant to all, particularly large, users of coal. The Parliamentary Committee of the Trade Union Congress has fixed March 11 as the date for a Special Congress to consider the position of the matter as it has been left by the decision of the Government. The next move is, if the resolution passed at the last Trade Union Congress is strictly observed, as to the steps to be taken to "compel" the Government to foist on the nation something the nation does not want, but the Miners' Federation do. The question that will have to be determined by the Special Congress is as to whether industrial action shall be taken to "compel" nationalization, or political action to promote the cause. Opinion in trade union circles, it is said, is hardening in favour of constitutional action. We hope it is.

Coal Profits and Industrial Supplies.

The difference between the Miners' Federation and the Accountants (Messrs. Tongue and Co.) appointed by the Government to investigate the profits of the coal industry was again the subject of discussion last week between the Prime Minister and representatives of the Federation. The latter still maintain that they are right in estimating that the profits for the year ending in July next will be 54 millions; and therefore they ask that the price of industrial coal shall be reduced, and the reduction in cost of production so effected shall, by some means or other, go to the reduction of the cost of living. The alternative is an application on behalf of the miners for higher wages. Messrs. Tongue, it will be remembered, estimated that the profits would only be 6 millions in the year ending March. The difference in the periods taken is accused by the Federation of being the cause of the want of agreement in the profit result. The Prime Minister suggested that representatives of the Federation and the Accountants should jointly confer over the matter; and this has been agreed to. It is understood the interview takes place to-day.

Capital Raising by Gas Companies.

There is no doubt the Public Utilities Companies (Capital Issues) Bill will be a measure of considerable usefulness to gas companies, in the position in which those stand who have not been to Parliament for special powers to issue redeemable debenture and preference stocks at higher rates of interest than hitherto. The remarks which accompanied the motion for the second reading of the Bill show that the Board of Trade are fully cognizant of the singular position in which the gas industry has been thrust by conditions that are incompatible with their statutory limitations. Mr. Bridgeman, the Parliamentary Secretary of the Board, says the Bill is designed to simplify procedure, and to save companies the expense of making individual applications to Parliament, and the time of Parliament considering such applications. A statement as to what the Bill is intended to permit was made in last week's "JOURNAL;" and from the speech delivered by Mr. Bridgeman in the House on Wednesday, as reported in our "Parliamentary Intelligence," it is learned that the Private Bill Authorities are in full sympathy with the plans of the Board. There are signs, however, that there are certain members who want to control the proposed liberty; and they will be much in evidence during the Committee stage of the Bill. An important thing is existing capital. If this capital stood well in the eyes of the public, and did not present so emaciated an appearance in value and earning power, the new Bill would have enhanced value.

Daylight Saving Every Summer.

It is not surprising to learn that it is highly probable that daylight saving during the summer months is to be a permanent institution in this country. The information came out in the House of Commons last Wednesday, when the Home Secretary, replying to a question, stated that the Government believe the general feeeling is strongly in favour of the continuance of the system of summer time; and so it is their intention to propose legislation for the purpose of making it permanent. The gas industry does not now trouble much about the change. Summer time is the period when it could easily manage to do a considerably larger business; but the losses actually due to daylight saving have been more than counterbalanced by the increased business in other directions.

If Bronze Coinage Disappears.

The nickel coinage question is again under consideration. It is reported that the experts of the Mond Nickel Company have been taken into consultation over the matter; and this has been said to show that, while the Company have denied that they have received an order from the Government for the supply of nickel, there is something in the wind. Bronze coinage seems growing in disrepute; and nickel coinage is in the ascendant. Most people would, we believe, be favourable to the change; but among those who will not welcome it with any effusive cordiality will be the gas industry and its prepayment consumers. If bronze coins are withdrawn, it will mean that there will have to be a a gradual alteration of all the mechanisms of the millions of penny-in-the slot meters. While this change was proceeding, which would take "x" years to perform, and be an expensive operation, gas undertakings would have to fall back on discs, which would have to be sold to consumers at twelve a shilling. Discs would mean a considerable addition to the work of each gas undertaking, and would rob the prepayment meter system of some of its simplicity and therefore attractions. But nothing has been settled yet; and perhaps the present little flutter over the matter may never develop. On the other hand, it may.

GAS AT THE IDEAL HOME EXHIBITION.

A VIEW OF THE SOUTH METROPOLITAN GAS COMPANY'S DISPLAY.

THE photograph reproduced of a portion of the stand gives a good idea of the nature of the display made by the South Metropolitan Gas Company at the Ideal Home Exhibition in Olympia, which was the subject of some appreciatory remarks in the "JOURNAL" for Feb. 10 [p. 298]. It may be added that, when at Olympia last Tuesday, the King and Queen entered the stand, and manifested great interest in the operations that were being demonstrated there in connection with the testing, &c., of the "Metro" burner.

Lampblack as a Domestic Fuel.

Practically all the artificial gas of California and Oregon is produced by the oil-gas process, which consists in cracking the oil hydrocarbons into permanent gases by spraying the oil over highly-heated chequer-bricks, in apparatus similar to the ordinary Lowe water-gas superheater. The amount of free carbon produced varies from 20 to 25 lbs. per 1000 c.ft. of gas; and in an article published in the "American Gas Engineering Journal," Mr. E. L. Hall (the General Superintendent of the Portland Gas Company) shows how it can be made into a readily marketed domestic fuel. The gases, tarry vapours, and free carbon produced in the generator pass through a water-seal so designed as to remove only the carbon. The wash-water contains somewhat over 1 p.ct. by weight of carbon; and for removing the carbon, the Oliver continuous filter is used. Of this plant, there are four units at the Portland Gas-Works, each having a capacity of 1000 gallons of water per minute. These units are placed two on each side of a 36-in. belt conveyor on to which the lampblack is discharged. The conveyor passes the carbon into four 50-ton driers, from which the dried material may be discharged by gravity into bucket elevators, which take it to overhead hoppers, installed directly over two 50-mould Fernholtz briquette presses. These are designed specially for the pressing of oil-gas carbon. The press operates at about seven revolutions per minute, producing 50 briquettes per revolution, or 350 briquettes per minute; and as each briquette weighs about ½ lb., the press, if operated continuously, would manufacture 126 tons a day. At the present time, about 2000 gallons of water per minute are treated, and 100 tons of carbon recovered per day. The carbon as it reaches the filter contains from 50 to 60 p.ct. of water, and it is dried to from 12 to 15 p.ct., which experience has shown to produce the hardest briquettes. No binder of any kind is used, as the small proportion of tarry constituents naturally present in the carbon is sufficient. The composition of the briquettes is very similar to that of anthracite coal.

Gas Consumption in the United States.—Figures which have been made public concerning the gas industry, show that in the United States there are approximately 8,500,000 consumers, and that the annual production is round about 327,000,000,000 c.ft. The number of consumers named represents something like one-half of the families in the United States.

COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

IN THE YEAR 1919.

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

——	Gas Light and Coke.	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.	Brentford.
Gas sold . . . . . thousands	30,508,889	13,414,601	3,792,028	2,828,470	2,717,534	2,450,159	4,278,007
Increase . . . . . per cent.	15·48	4·88	6·91	9·93	Dec. 1·3*e*	6·03	4·28
Gas made per ton of coal carbonized. cubic feet	12,201	12,275	13,442	12,697	11,441	11,585	11,444
Gas unaccounted for . . . . . per cent.	6·80	5·48	7·30	8·71	9·93	7·87	9·02
Coke made for sale per ton of coal . cwt.	10·26	9·99	11·59	11·03	8·94	8·57	10·32
Tar made per ton of coal. . . . . galls.	9·15	9·17	9·28	9·45	..	8·82	10·95
Liquor made per ton of coal . . galls, 8 oz.	35·26	38·45	38·18	35·95	36·26	29·91	35·43
Percentage of coke used as fuel	17·23	18·59	14·19	12·79	30·69	31·16	17·45
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Capital expended per 1000 cubic feet sold during the past year	9 4·87	8 7·16	7 8·09	7 9·98	8 11·69	9 2·58	6 7·81
Price charged per 1000 cubic feet	4/4, 4/2 & 4/8	4/4 and 4/8	3/8	3/8 to 4/8	4/0 to 5/2 / 5/2 to 6/4	4/0 to 4/10	4/0 and 4/10
Costs per 1000 Cubic Feet of Gas Sold.							
REVENUE ACCOUNTS.	d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.	37·38	40·57	31·96	37·19	37·12	33·24	37·50
Less residuals—Coke and breeze.	16·68	19·84	13·82	13·92	12·04	10·68	8·86
Tar	2·44	2·99	2·74	3·18	2·43	2·36	2·95
Amm. liq. and sulph. amm.	2·29	2·86	2·43	1·77	1·89	1·32	1·28
Total residuals . . .	21·41	25 69	18·99	18·87	16·36	14·36	13·09
Net for coals, oil, &c. .	15·97	14·88	12·97	18·32	20·76	18·88	24·41
MANUFACTURE—							
Salaries	0·40	1·28	·65	·61	1·07	·33	0·69
Wages—carbonizing	4·24	3·86	3·29	4·69	4·42	2·62	3·98
Purification	0·47	1·15	·37	·71	·54	·61	0·73
Repairs—plant	11·08	12·17	8·82	10·37	7·63	10·25	8·68
Net manufacture . .	32·16	33·34	26·10	34·70	34·42	32·69	38·49
DISTRIBUTION—							
Wages and salaries	1·97	1·59	1·56	2·15	2·32	·91	2·03
Repairs—Mains and services, &c.	2·97	2·83	2·35	2·23	3·42	2·85	1·72
" Meters and prep. meters and fittings.	2·44	4·32	2·94	1·87	3·43	2·69	1·62
" Stoves—ordinary and prepayment .	2·36	2·31	2·34	2·36	2·72	·91	1·78
Total net manufacture and distribution .	41·90	44·39	35·29	43·31	46·31	40·05	45·64
Public lamps—lighting and repairing . . .	0·94	·97	·75	1·01	1·23	·27	0·61
Rents, rates, and taxes	3·63	2·06	2·08	1·91	1·87	1·06*g*	2·92
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary, &c.)	0·32	·37	·42	·57	·85	·47	0·53
Collectors	1·01	1·45	1·38	1·04	1·05	·55	0·88
Stationery and general charges.	0·43	·95	·69	·73	·77	·55	0·51
Profit-sharing	0·29	..	·38	..	·16	·15	..
Bad debts.	0·05	·03	·01	·05	·02	·00	0·02
Law and parliamentary charges . . .	0·01	·03	·03	·03	·13	·02	0·08
Superannuations, Pension Funds, &c. . . .	0·69	·71	·74	·28	·43	·42	0·49
National Insurance	0·08	·20	·07	·09	·08	·07	0 07
Active service allowances	0·04	·13	·15	·10	·16	7·46*h*	0·08
Sundries	0·03	·04	·02	·02	..	..	0·00
Total expenditure (*less* residuals) . . .	49·42	51·33	42·01	49·14*c*	53·06	51·07	51·83
GAS.	51·35	52·28	42·49	48·37	53·19	49·72	50·26
Rentals—Meters and prep. meters and fittings.	3·12	3·93	3·48	3·20	2·74	1·95	4·40
Stove	1·51	1·47	1·89	3·22	2·03	4·02	1·38
Incand. mantle maintenance . . .	..	..	·11	·18	..	·02	..
Miscellaneous	0·13	·05	·01	·05	·07	·13	0·01
Total—Gas, rentals, &c.	56·11	57·73	47·98	55·02	58·03	55·84	56·05
Balance, being profit	6·69	6·40	5·97	5·88	4·97	4·77	4·22
Dividend and interest	7·13	5·77	5·73	5·25	5·73	4·59	4·78
Surplus or deficit	Def. 0·44	·63	·24	·63	Def. ·76	·18	Def. 0·56
Contributions to funds and sundry payments . .	..	·12*b*	·04*a*	·12*d*	·43*f*	..	0·07*a*
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	38 8·97	38 7·80	36 10·91	41 3·68	..	36 5·37	..
Coke realized per ton of coal	19 5·27	18 8·51	19 0·74	15 7·57	13 4·28	13 11·79	13 3·69
Coke " " of coke	37 10·68	37 5·55	32 10·93	28 4·11	29 10·53	32 7·42	25 9·55
Breeze " per ton	10 11·06	5 4·94	1 1·05	5 8·79	5 2·70	1 11·12	2 11·73
Tar realized per gallon	0 3·91	0 3·72	0 4·72	0 4·72	0 3·44	0 4·26	0 4·53
Amm. liquor, &c., realized per butt (8 oz.) .	8 6·53	7 7·96	9 6·29	6 4·52	6 4·07	6 3·87	5 11 12
Percentage of stoves at rental to consumers .	79	106	77	100	110	68	97
Bad debts per cent. on total receipts . . .	0·07	·03	·01	·06	·02	·00	0·03
Net profit per cent. on ordinary capital . . .	2·65	3·53	3·34	4·54	2·96	3·32*i*	2·57
One penny variation equals.	£127,120	£55,894	£15,800	£11,785	£11,323	£10,209	£17,825
Water gas, per cent. on total make	23·61	..	26·26	21·64	24·89	34·21	43·65

a Stamp Duty.
b Cost of Writing-down Investments.
c Capital Duty Eliminated.
d Capital Duty.
e On Amalgamated Co.'s Figures.
f Compensation to Directors and Auditors of the Dartford Co. and Conveyance Duty.
g Less Income-Tax, Cr. ·43d.
h Including 7·34d. War Wage.
i Including Electricity Results.

COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

TABLE SHOWING THE VARIATION, INCREASE OR DECREASE, ON FIGURES OF CORRESPONDING YEAR, 1918.

[The figures in heavy type show the decreases.]

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

	Gas Light and Coke.	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.	Brentford.
Gas sold . . . . . thousands	4,090,143	623,906	245,099	255,522	180,852*	139,258	175,761
Increase (variation equal to) . . . per cent.	22·37	14·96	10·60	16·11	5·69	11·46	11·36
Gas made per ton of coal carbonized. cubic feet	248	76	241	507	3	374	6
Gas unaccounted for . . . . . per cent.	**1·22**	·22	·18	·08	·36	·86	1·79
Coke made for sale per ton of coal . cwt.	·34	**·01**	·12	·30	·95	·88	·33
Tar made per ton of coal . . . . galls.	**·17**	**·17**	**·97**	1·40	..	**·73**	**·57**
Liquor made per ton of coal . . . galls, 8 oz.	·76	**1·89**	·67	·48	**1·28**	·61	·52
Percentage of coke used as fuel	**1·11**	**·06**	·87	**1·44**	**2·54**	6 62	**2·63**
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Capital expended per 1000 cubic feet sold during the past year	**1 4·46**	**0 4·09**	**0 9·78**	**0 2·08**	o 4·31	**0 6·52**	**0 2·22**
Price charged per 1000 cubic feet‡	o 3·00	o 6·50	**0 1·00**	o 4·25	o 6·25	o 9·00	o 4·50
Costs per 1000 Cubic Feet of Gas Sold.							
REVENUE ACCOUNTS.	d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.	4·01	3·32	**2·14**	2·60	4·93	3·55	3·20
Less residuals—Coke and breeze	4·74	5·78	2·84	3 33	2·64	2·06	1·25
Tar	**·82**	**·31**	·15	·48	·67	·29	·07
Amm. liq. and sulph. amm.	·02	**·11**	·17	·00	**·31**	·12	·22
Total residuals . .	3·94	5·36	3·16	3·81	3·00	2·23	1·10
Net for coals, oil, &c.	·07	**2·04**	**5·30**	**1·21**	1·93	1·32	2·10
MANUFACTURE—							
Salaries	·08	·34	·04	·04	·29	**·01**	·12
Wages—carbonizing	·64	·57	·54	·85	1·52	**·06**	1·00
Purification	**·03**	·30	·08	·18	**·11**	**·06**	·20
Repairs—plant	3·25	3·60	2·94	3·02	1·94	2·83	1·77
Net manufacture . .	4·01	2·77	**1·70**	2·88	5·57	4·02	5·19
DISTRIBUTION—							
Wages and salaries	·32	·34	·35	·14	·56	·04	**·50**
Repairs—Mains and services, &c. . . .	·93	1·20	·91	·79	1·31	1·24	**·11**
,, Meters and prep. meters and fittings	·09	1·94	**·55**	·68	1·06	·61	**·30**
,, Stoves—ordinary and prepayment .	·49	1·36	**·50**	·91	1 11	**·01**	**·04**
Total net manufacture and distribution	5·84	7 61	·61	5·40	9·61	5·92	6·14
Public lamps—lighting and repairing	·29	·15	·17	·26	·30	·13	·20
Rents, rates, and taxes	**·23**	**·37**	·09	·51	**·27**	**·23**	·80
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary, &c.).	·03	·02	·03	**·02**	·06	**·03**	·05
Collectors	·18	·35	·04	·24	·25	·02	·11
Stationery and general charges	**·03**	·23	·05	·06	·27	**·11**	·08
Profit-sharing	**·07**	..	·24	**·02**	·01	·07	..
Bad debts	**·01**	·00	**·02**	**·01**	·01	**·02**	**·03**
Law and parliamentary charges	**·02**	**·02**	**·06**	**·06**	**·09**	**·01**	**·12**
Superannuations, Pension Funds, &c. . . .	·19	·19	·37	·00	**·03**	**·08**	·03
National Insurance	·00	**·05**	**·01**	·01	·02	·01	·01
Active Service allowances	**·11**	**·17**	**·34**	**·24**	**·23**	2·74	**·29**
Sundries	**·01**	**·01**	·00	**01**	..	..	·00
Total expenditure (*less* residuals) . .	6·11	8·03	1·17	6·12	10·11	8·41	6·98
GAS	3·16	7·78	·13	5·06	7·41	7·73	5·47
Rentals—Meters and prep. meters and fittings	·29	·95	·30	·37	·40	·11	·20
Stove	**·17**	·12	**·05**	·55	**·05**	**·05**	·05
Incand. mantle maintenance . .	..	..	·01	·04	..	·01	..
Miscellaneous	**·02**	**·01**	·01	**·03**	·01	·00	·00
Total—Gas, rentals, &c.	3·26	8·84	·40	5·99	7·87	7·56	5·72
Balance, being profit	**2·85**	**·81**	**·77**	**·13**	**2·24**	**·85**	**1·26**
Dividend and interest	**1·23**	**·34**	**·80**	**·69**	**·32**	**1 34**	**·26**
Surplus or Deficit.	**1·62**	1·15	**·03**	·56	**2·56**	·49	**1·00**
Contributions to funds and sundry payments .	..	·12	0·4	·12	·43	..	·06
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	4 10·63	3 3·99	**0 0·76**	3 3·87	..	6 2·19	..
Coke realized per ton of coal	5 9·21	5 5·21	3 6·00	3 7·12	3 1·55	3 2·76	2 4·30
Coke ,, ,, of coke	10 3·89	10 11·00	5 9·24	5 10·95	4 3·26	4 7·87	3 10·56
Breeze ,, per ton	7 0·55	4 1·41	**0 5·15**	3 3·13	**0 7·82**	**0 0·98**	**0 6·31**
Tar realized per gallon	**0 1·05**	**0 0·30**	o 0·57	o 0·45	o 1·00	o 1·01	o 0·48
Amm. liquor, &c., realized per butt, 8 oz. .	o 1·79	o 1·44	o 2·89	o 0·75	**0 8·94**	**0 2·26**	**0 7·65**
Percentage of stoves at rental to consumers .	9	3	1	1	2	1	1
Bad debts per cent. on total receipts . . .	**·02**	**·01**	**·03**	**·03**	·00	**·03**	**·05**
Net profit per cent. on ordinary capital . .	**1·11**	·84	·02	·28	**2·41**	**·67**	**1·32**
One penny variation equals	£17,042	£2600	£1021	£1064	£754	£580	£732
Water gas per cent. on total make . . .	**·20**	..	**3·30**	**1·07**	·90	5·62	3·52

* This figure represents the variation on the Absorbing Company's own figures, and not on those of the Amalgamating Companies, whereas on the preceding table the increase on the "Gas Sold" is on the Amalgamated figures. ‡ These figures show the average variation on the year in the Companies' principal areas.

PERSONAL.

The Directors of the Bournemouth Gas and Water Company have accepted with regret the resignation of the Engineer and General Manager, Lieut.-Col. H. W. WOODALL, C.I.E., who has served the Company with marked ability for nineteen years. His assistance in a consultative capacity has, however, been retained for the Company. Mr. P. G. G. MOON, who managed the works to the entire satisfaction of the Board in the difficult period when Lieut.-Col. Woodall was absent on war service, has been appointed to succeed him.

Mr. H. BLAKEY, Gas Manager to the Spalding Urban District Council, has been appointed to a similar position with the Hindley Urban District Council, in succession to the late Mr. Harold Timmins.

Mr. D. H. DAVIES, of Herne Bay, has decided not to accept the position of Engineer and Manager of the Hyde Gas Company, his selection for which was recorded last week.

OBITUARY.

Mr. WILLIAM MARTIN, formerly Secretary of the Continental Union Gas Company, Ltd., died at his residence at Kenley, Surrey, on Friday morning. He had been in failing health for some time; and his condition had been critical since Christmas. Mr. Martin (who at the time of his death had reached the age of 71 years) spent a lifetime in the service of the Union des Gaz and the Continental Union Gas Company; and he celebrated the completion of his fifty years' association with these Companies in 1916, shortly before his retirement.

ELECTRICITY SUPPLY MEMORANDA.

ACCORDING to the new Electricity Supply Act, the number of Electricity Commissioners is not to exceed five; and the Minister of Transport has succeeded in appointing four. It was known some time since that Sir John F. C. Snell was to be Chairman of the Commissioners; and his associates are to be Mr. H. Booth, Mr. W. W. Lackie, and Mr. Archibald Page. We think these appointments will meet with unqualified approval by most electrical men. Sir John Snell holds a very high position in the electricity industry; he is well known, and has many friends, in the gas industry. In him the electricity industry has full confidence. Mr. H. Booth was one of the principal clerks at the Board of Trade; and he was a member of the Electric Power Supply Committee. Mr. W. W. Lackie joined the Electricity Department of the Glasgow Corporation in 1892, and was appointed Chief Engineer in 1904, and Manager-Engineer in 1915. He has done exceedingly good work for Glasgow; and the Corporation of that city will miss him. But the call to the higher position is irresistible; and service to Glasgow has to yield to service to the nation. For Mr. Archibald Page, Sir Eric Geddes has also gone across the Border. This gentleman has been General Manager of the Clyde Valley Electrical Power Company. Sir John Snell, who has for some years been a Consulting Electrical Engineer, and has had a large practice both in connection with municipal and company electricity supply, was at one time the Borough Electrical and Tramways Engineer at Sunderland. Mr. Lackie has also worked in the municipal atmosphere; and Mr. Page in that of a large Power Company. Electricity supply companies in urban areas might well suggest that the fifth Commissioner should be a man trained in and drawn from their own region of activities. It would be advisable to have the experience well mixed.

The Commissioners.

Gas Coke in Electricity Stations.

Those electrical writers who have fallen into the bad habit of sneering at gas coke as a fuel for use in the raising of steam at electricity stations are having the conviction poured upon them that they have been writing about something they do not understand. It is perfectly patent that their ignorance of the subject is not having any effect on electrical engineers of the foremost rank. It was mentioned in the "Memoranda" for Feb. 10 that Mr. S. L. Pearce, the Electrical Engineer to the Manchester Corporation, had adopted, in connection with his new 25,000 KW. set, the "Sandwich" system of utilizing coke breeze and coal, as originally proposed by Mr. E. W. L. Nicol, the expert for the London Coke Sales Committee. Mr. Pearce would not be doing this if he were not satisfied regarding both economy and efficiency. As a matter of fact, the stratified bed of coal and coke or breeze results in intensified combustion; and the evaporative duty leaves nothing to be desired. Coal and freights and railway rates have ascended to very high costs, and are not likely ever to recede to anything like pre-war figures. The new conditions alone of labour from the mines through the transport and handling services will prevent this. Thus the greater need for economy. There has been very large experience of the "Sandwich" system of utilizing coke and coke breeze at the Greenwich Power Station of the London County Council. It has there been on a scale and over a period of time to which no objection can be taken by those who ardently oppose the electricity industry having any trading connections with the gas industry. The folly of such an attitude needs no comment. To be logical, these opponents ought to object to the use of coal because coal competes with electricity for heating and power purposes; and so does oil. If the same childish objection prevailed with all competing fuels, the electricity industry would have to fall out of business altogether. It cannot do without fuel; and therefore it is wise to adopt methods that develop the highest economy.

Coke Experiences at Greenwich.

However, as to the coke experiences at the Greenwich Power Station. It was in June, 1918, that the erection of duplicate shoots from the fuel bunkers into the hoppers on eight boilers—the number is worth noting—at this large power station was authorized, with a view to the burning of coke and coke breeze on the "Sandwich" system. An official report presented to the County Council last Tuesday states that the shoots have been in operation for a considerable period, during which "the results have been extremely satisfactory," and have led to a large proportion of coke being consumed with the coal. This has produced "a considerable saving in the cost of fuel." There can be no doubt there. The scale and duration of the experience is all that can be desired. "Extremely satisfactory" and "considerable saving" are expressions that leave no room for doubt. As a result of this experience, it is proposed that similar shoots should be fitted to twelve more boilers at an estimated cost, including erection, of £4200; and that a further sum of £4500 should be spent in raising the divisions in the coal-bunkers above these boilers. This sum of money is not being spent in adapting a further twelve boilers for sandwiched coke and coal—making twenty boilers in all—without good and sufficient reason. The statement in the report is a very solid and unassailable reason: "From the figures obtained of the working of the existing shoots, and based on the present prices of coal, it is estimated that, owing to the increased use of coke and coke breeze, a saving of about £8000 a year can be effected, so that the total cost will be nearly paid for by the saving during the first year." It is not often that an economy in process will in such a short time as this result in compensating for the outlay occasioned by the change. There is another point. In these days, there is great disuniformity in the grades of coal delivered; and much of it is of a low order in respect of quality. The divisioned bunkers and the duplicate shoots enable low-grade classes of fuel to be dealt with on the "Sandwich" system at much higher efficiency than would be the case if burned separately. Where coke is used with a low-grade coal, it assists in keeping the bed of fuel on the grate in a porous state, and so, the air having a freer passage through the bed, a more intensified combustion is obtained. There are advantages in the "Sandwich" system, apart from the direct money saving.

Good Carbonizing Coal and Steam-Raising.

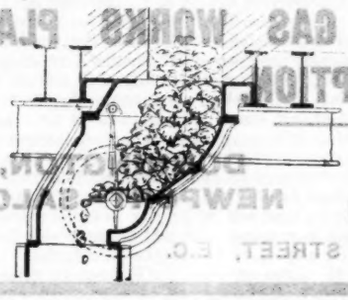
Electricity station engineers will have to consider very seriously the matter of using low-grade coal for steam-raising; and, employing the "Sandwich" coal and coke system. It may be that before long there will have to be an absolute prohibition of the use of all good coking coal for such a single purpose as generating electricity, because the coal will be wanted by the nation for the highest production of gas, coke, and other valuable materials which enter largely into the chemical, dye and colour, agricultural, and other industries of our country; and the quantity carbonized must not be greater than is necessary to meet current requirements. According to Prof. Fearnsides, of Sheffield University, there is nearly five times as much coal in Great Britain that will not coke as there is of coal that will coke. In other words, while there is sufficient non-coking coal to meet our needs for perhaps 500 years, there is only sufficient coking coal to last 120 years. Of course, from most coals gas can be made; but there is a great difference in the profitableness with which it can be carbonized, in the interests of both the country and the carbonizers themselves. Thus, the coals most suited for carbonization should be preserved for this purpose, and not be allowed to be dissipated at an undue rate by using them for steam-raising purposes only, or by unnecessarily prefacing the electricity-generating system with carbonizing plant. What this would mean has been shown by the Nitrogen Products Committee's report. Whereas by direct-firing, 6·5 tons of coal per KW.-year would be required, with one or other of the systems of carbonizing preceding generation, the coal requirement would range from 8·6 to 16·2 tons of coal per KW.-year. From the national point of view, there ought to be prohibition of the use for steam-raising, or carbonization in excess of requirements, of all coals that yield well in gas, coke, and chemicals.

Mr. Klemens Returns to the Attack.

Our last criticism of Mr. B. L. Klemens's performances in the "Electrical Review" was on Dec. 23. Now, after the lapse of several weeks—on Feb. 13—he supplies readers of our contemporary with more material largely drawn from imagination, and obviously written with supreme ignorance of gas and its manufacturing processes. This electrical exponent of the relative position of the gas and electricity supply industries, who spoke of untruths in dealing with the work of Sir Dugald

WOODALL-DUCKHAM VERTICAL RETORTS

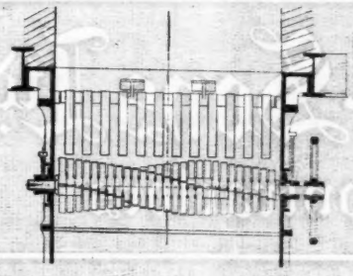
FIRST IN 1903 WITH FOREMOST IN 1920



THE EXTRACTION of the COKE from CONTINUOUS VERTICAL RETORTS governs the whole working of the plant.

THERE MUST BE EVEN and CONTINUOUS TRAVEL of the CHARGE through the RETORT.

THE SPEED of EXTRACTION must be readily varied to all or individual RETORTS to SUIT the TEMPERATURE of the SETTINGS, the Quality of the COAL, or the SPECIAL CONDITION of any RETORT.



THERE MUST BE FREEDOM of ACCESS to the whole of the RETORT at the BOTTOM.

THE WEIGHT of the CHARGE must not be carried on the EXTRACTING DEVICE

THE HELICALLY FORMED EXTRACTOR on the WD RETORTS FULFILLS ALL THESE CONDITIONS.

For all particulars apply to

The WOODALL-DUCKHAM CO LTD

THANET HOUSE 231/2 STRAND W.C.2

Telephone 6630 CITY *Telegrams*: RETORTICAL ESTRAND : LONDON

MEMBERS :- Arthur Duckham & Co. Ltd. Newton Chambers & Co. Ltd. T. Vale & Sons Ltd. Gibbons Bros. Ltd.

DIRECTORS :- Sir Arthur Duckham W. Newton Drew F. Vale W. P. Gibbons Sir Wm. Jones

GASHOLDERS

MILBOURNE PATENT ROLLER CARRIAGES. AUTOMATIC LUBRICATION

PURIFIERS

WITH

MILBOURNE PATENT DUPLEX VALVES, AUTOMATIC COVER FASTENERS, SAFETY DISCHARGE SHOOTS, RUBBER JOINTING. "MILBEL" PATENT PURIFIER GRIDS.

CONDENSERS, SCRUBBERS, AND GAS WORKS PLANT OF EVERY DESCRIPTION.

C. & W. WALKER, LTD., DONNINGTON, NEWPORT—SALOP.

LONDON OFFICE: 110, CANNON STREET, E.C.

Saml Cutler & Sons Ltd

Engineers and Contractors

Complete plants for the production of

Coal Gas, Water Gas, Hydrogen Gas.

Poplar Iron Works, Millwall. London. 59 Victoria Street, Westminster.

Clerk in this connection, who asserted that the whole campaign of the gas companies was one of "misrepresentation and suppression of vital facts," and who himself made several assertions that were foreign to the truth, now speaks of our "abuse." Apparently he is a gentleman who underestimates the qualitative value of the expressions he uses, and overestimates that of the expressions other people employ. In the present article, he asserts that the figure given as the efficiency of a gas-oven by the Gas Light and Coke Company was "palpably false." When he has time to study the article by Sir Dugald Clerk in last week's issue of the "JOURNAL," he will see that the figure Sir Dugald adopted for the gas-oven was the "mean value" given by the independent heating expert Mr. A. H. Barker for the whole country, and not the attainable value by the latest types of gas-ovens. Then he gets into a hopeless tangle over coke; and thus betrays his ignorance of gas matters. It is known to every engineer and chemist who has anything to do with coal that it varies greatly in its physical and chemical properties; and so does its calorific value. Consequently the yield of coke per ton varies. A very fair general figure as to the coke for sale where coal carbonizing only proceeds is 10 cwt. per ton; but this amount is reduced where steaming is practised, or where water gas is made. The net amount actually for sale depends on the character of the coal, and the amount that is used on the works in the various manufacturing processes. The Gas Light and Coke Company last year, as the accounts just issued show, carbonized 2,082,059 tons of coal, from which 1,290,563 tons of coke were made. On the works 222,386 tons were used, and 1,069,095 tons were sold. The difference (918 tons) between the make and the total quantities used on the works and sold was taken from stock. What do these figures show?—that a quantity of coke was sold and paid for exceeding 10 cwt. per ton of coal carbonized. The South Metropolitan Company last half year carbonized 588,496 tons of coal, made 360,956 tons of coke, and sold 295,996 tons. Nevertheless, our former statement, according to Mr. Klemens, "does not bear examination." He calls attention to the different calorific values quoted for coke. For the reasons already given, coke has different calorific values, just as coal has. So in discussion a figure has to be taken that approximately represents an average quality of coke, which Mr. Klemens perhaps knows consists very largely of carbon. Clinging tenaciously to his belief that only 8 cwt. of coke is "obtained" per ton of coal "baked," or 8 lbs. per 20 lbs. of coal used, he says that Sir Dugald Clerk's figure of 41 p.ct. of the heat of the coal being in the coke sold would make the coke possess a higher calorific value than the original coal—13,325 B.Th.U. per pound of coke, as compared with 13,000 B.Th.U. for the coal. If he will take 10 cwt. of coke sold per ton of coal carbonized, as the figures of the Gas Light and Coke Company and the South Metropolitan Company (they are not small carbonizers of coal) justify him in doing, he will find that Sir Dugald's 41 p.ct. is a figure that can be defended with ease. In regard to the rest of Mr. Klemens's article, we see he has not yet overtaken Sir Dugald Clerk's contribution to our issue for Feb. 10. Perhaps now he will deal with that, and probably it will assist him to revise his views. Further comment can be deferred until we see what he has to say to the points in Sir Dugald's fresh contribution. This course may save some criticism on our part. Anyway Mr. Klemens may rest assured that, if he is not now satisfied as to his own errors and incorrect assumptions, whatever he has to say will receive respectful consideration—and further criticism.

EARLY DAYS IN THE OLD KENT ROAD.

THOUGH the study of history can never be uninteresting, it must be admitted that the pleasure derivable from it by the student depends considerably upon the historian. Therefore the South Metropolitan Gas Company are to be congratulated upon having the events of their early years set forth by Mr. Walter T. Layton, who marshals his facts in very readable form, in a plentifully illustrated volume, a copy of which has lately been received.

The early years are from 1833 to 1871; but the ten chapters devoted to them are preceded by an introductory note dealing with the dawn of gas light, and followed by a supplementary note briefly covering the period from 1871 to the present time. It was in 1829 that the formation was decided upon of the South Metropolitan Gas Light and Coke Company, to supply cannel gas; and the site selected for the works was a piece of land, of less than three acres, adjoining the Grand Surrey Canal on the eastern side of the Old Kent Road. The works were completed and put in operation in 1833; the plant including two gasholders (each about 50 ft. in diameter and 18 ft. deep) which were guided by central columns. The price charged for gas in 1834 was 11s. per 1000 c.ft., but many lights were supplied by contract. Thereader is introduced to many early officials of the Company, more than one of whom appear to have proved themselves an unfortunate choice. In 1838, at a time when the Board were being advised by Mr. Kirkham, afterwards Engineer of the Imperial Gas Company, there was a change from cannel to Newcastle coal, accompanied by a reduction in price from 11s. to 9s. per 1000 c.ft., and the following year the name of Livesey is first noted in connection with the Company—Mr. Thomas Livesey (a portrait of whom is included in the book) being appointed Chief Clerk, and coming, with his wife and their child George, a boy of five years old, to reside near the works. "So," says Mr. Layton, "commenced an epoch which lasted almost exactly seventy years, and the influence of which will be felt, it may be, for centuries."

Mr. Thomas Livesey had only been eight months with the Company when the then Managing-Director notified his intention of retiring; and Mr. Livesey's conduct and ability had so greatly impressed the Board that they deemed it unnecessary to fill the vacancy. The Royal Assent was given in 1842 to "an Act for incorporating the South Metropolitan Gas Light and Coke Company, and for more effectually lighting with gas certain places within the borough of Southwark, and other parishes and places in the counties of Surrey and Kent." The capital was fixed at £200,000, in £50 shares, with profits limited to 10 p.ct. per annum—any excess to be applied to reducing the price of gas. The price of gas was reduced in 1843 to 8s. per 1000 c.ft., conditional on meter-rents being paid; and in the same year, we are told, a 5-in. main, 2200 yards long, was laid in the Brixton Road. "It was estimated that at least eighty lights would be required in this road." About this time, one reads of makes of 9800 c.ft. and even 9950 c.ft. of gas per ton of coal carbonized. By 1848 the price of gas had come down to 6s. per 1000 c.ft.; and clay retorts, which had failed at the Brick Lane Station of the Chartered Company, were successfully adopted—thus giving a great impetus to "the application of that class of refractory material which has made our modern methods of carbonization possible." The price of gas was in 1850 reduced to 5s. per 1000 c.ft., with discount.

The next important step was the districting arrangements between the various companies, in bringing about which Mr. Thomas Livesey was exceedingly active. On Dec. 9, 1857, Mr. G. Livesey (who had been on the staff nearly eight years, and was then 24 years of age) was designated Assistant Manager. Three years later the price of gas was 4s. 2d. per 1000 c.ft. in the town districts; meter-rents not to be charged when 30s. worth of gas per annum was used. Projects for considerable extensions and developments of the Company's works and plant were considered in 1864; and a Bill was passed authorizing the purchase and removal of the parish church (Christ Church) and an increase of £100,000 in the capital of the Company. The Metropolitan Gas Referees are in evidence in the minutes of Board meetings in 1869; and another minute in the following year records a resolution: "That the sum of £100 be given to Mr. G. Livesey, the Company's Engineer, for the use of his patent water-valve and manhole lid for gasholders." Very shortly after this, amalgamation was very much "in the air;" but it was some time before anything definite was accomplished in this direction.

The Company suffered a great loss in 1871, by the death, in his 65th year, of Mr. Thomas Livesey, who left the Company with reconstructed works, a 10 p.ct. dividend, gas at the low price of 3s. 2d. per 1000 c.ft., a loyal staff, and the reputation of being the best-managed gas-works in the Metropolis. Mr. Layton tells us that, on Oct. 10, Mr. Livesey "went with his medical adviser to consult Sir William Gull, the famous specialist, and while the consultation was proceeding, an attack of angina pectoris closed the earthly career of Thomas Livesey in the zenith of his popularity, and closed also an administration of the affairs of the South Metropolitan Gas Company which had won for it a foremost place in the ranks of gas undertakings." Recording the high terms in which the Directors referred to the services of Mr. Thomas Livesey, and the appointment as Secretary of his son, brings this portion of Mr. Layton's labours to an end. The administration of Mr. (afterwards Sir George) Livesey will afford him ample material for his next volume. This is sufficiently proved by the brief sketch comprising the supplementary note to the present book.

Coal Tar Products Export Licences Revoked.—The Board of Trade (Licensing Section) announce that Privy Council Licences for the export of all coal-tar products, except finished dyestuffs, but including aniline oil and salts, granted before Jan. 1, 1920, will be revoked as from Feb. 21, 1920; but applications for the renewal of any such licences will be considered, if special cause can be shown.

Recent Wills.—Mr. Joseph Braddock, of Oldham, one of the founders of Messrs. J. & J. Braddock, who died last October at the age of 82 years, left estate of the gross value of £121,826; the net personalty being £121,500. Among other wills proved are those of Mr. William Duff, of Morecambe, who left estate of the gross value of £15,080; and Mr. Frederick Carter Moon, gas engineer, formerly of Scarborough, £5325.

A New Smoke Abatement Committee.—The Ministry of Health announce the appointment of a Committee to consider the present state of the law as regards the pollution of the air by smoke and other noxious vapours, and to advise what steps are desirable and practicable to diminish the evils that still arise from such pollution. A Departmental Committee was appointed by Mr. Herbert Samuel in 1914 to inquire into this subject, and had made some progress in taking evidence when the war broke out, and the proceedings were discontinued. Lord Newton will be the Chairman of the new Committee; and the members include Prof. J. B. Cohen, F.R.S., of Leeds University, and Mr. W. S. Curphey, the Chief Alkali Inspector to the Ministry of Health. Mr. E. C. H. Salmon will act as Secretary to the Committee; and communications should be addressed to him at the Ministry of Health, Whitehall, S.W. 1.

BENZOL RECOVERY IN FRANCE.

M. Grebel on Policy and Methods.

(*Concluded from p.* 365.)

The portion of M. Grebel's paper which deals with the determination of the benzol content of gas may be passed over, since it consists chiefly of an abstract of the method published some few months ago by M. E. Sainte-Claire Deville, a full account of which was given in the "JOURNAL" for Feb. 11 last (p. 272); and of the conclusions more recently expressed by M. Ch. Berthelot, in the paper published in the "JOURNAL" for Aug. 5 last (p. 290).

As regards the composition and yield of benzol, M. Grebel points out that benzol from rich gas is the poorest in pure benzene, the content of which in crude benzol ranges from 40 to 80 p.ct. It is often difficult to trace the effect of the nature of the coal carbonization, and of the condensing and washing practice on the character of the recovered benzol. The following are some examples of crude benzol from gas-works during the war:

	Per Cent. of Distillate Collected in Fractional Distillation Below.	
	120° C.	180° C.
Havre	69	83
Bordeaux	73	80
Lyons	72	79
Nantes	85	88
Paris—I.	91	99
,, II.	40	97
,, Suburban districts—		
Benzol	99	—
Toluol	78	—
Solvent	—	99

In the case of unwashed crude benzol from coke-ovens, the percentage distilling below 120° C. is 80 in some cases and less than 40 in others.

The production of benzol per tonne of coal may vary from 6·5 to 13 kilos. In gas-works it ranges as a rule between 10 and 13 kilos; while the quantity recovered varies generally from 5 to 10 kilos. The chief part of M. Grebel's paper is, however, devoted to the materials for the absorption of benzol from gas, and particularly that introduced during the period of the war by M. Brégeat. In the United States the oil most commonly employed is a heavy petroleum distilling between 250° and 350° C., perfectly fluid at 4° C., and of density ·880 at 15° C. Use has also been made of the very fluid oils coming from certain furnaces supplied with crude liquid fuel. But on the Continent use is made almost exclusively of tar oils boiling as a rule between 200° and 350° C. Some engineers prefer mid-phenol oil, and others, heavy anthracene oil (Bueb oil) as used by the Paris Gas Company for the removal of naphthalene.

In certain coke-ovens in the North of France commercial considerations favour the use of green (anthracene) oil of still heavier density than that recommended by the German constructor Hirzel. As a rule, phenol oil which begins to distil at 210° C., and of which 90 p.ct. comes over below 270° C., appears to be the least bad, if not the cheapest. M. Grebel has found that a badly-separated oil, containing water and benzol from the heavier fractions, gives bad results. All these oils are of mediocre efficiency, absorbing at the most only 2 to 3 p.ct. of benzol. For the removal of 20 grams of benzol from a cubic metre of gas, it is therefore necessary to use 1 litre to 0·7 litre of oil—2 to 1·3 litres, for the removal of 40 grams of benzol. There is thus a large quantity of oil which has to be kept in circulation in the washers.

According to M. Brégeat, if the question of absorption is considered with due regard also to that of subsequent distillation, there is an advantage in increasing the circulation of the absorbent oil. It is better to use heat recovered from the absorbent than heat freshly obtained from steam for the heating of certain parts of the distillation plant; and there can be no further advantage in not distilling the benzol from the solvent to the maximum degree. The best conditions depend greatly, in each case, on the sizes of the heat exchangers, the temperature of available water, and the nature of the absorbent.

The absorbent properties of oils is affected by temperature. According to some experiments made by M. Fieschi, the efficiency of washing with heavy oil falls off considerably towards 30° C.; while it does not rise to any great extent as the temperature falls below 25° C. Except in cases where there is an ample supply of cold water, cooling causes additional costs which tend to counterbalance the advantage of reducing temperature below 25° C.

A further practical observation is made by M. Brégeat—viz., that it is necessary to carry out previous cooling of the gas if any appreciable benefit is to be secured from cooling of the absorbent. The fact is no doubt explained by the very short time of contact between the gas and the solvent in industrial washers, also by the production of heat by condensation of steam contained in the gas, and by the small amount of heat of solution. There is thus the effect of counterbalancing the transfer of heat from the gas to the liquid solvent; and the stabilizing of vapour-tensions will be brought about at the temperature of the gas when this latter is greater than that of the liquid. M. Grebel notes that he has frequently observed that the temperature of the gas at the outlet of the washers does not rise or fall in correspondence with the heat lost by the oil. He suggests that this question of efficient cooling is one to be further studied.

The loss of oil through priming in the washer usually amounts to about 2 kilos per 1000 cb.m. of gas; the loss varying with the speed of the gas and the viscosity of the oil. With a view to avoid priming in the washers and distillation columns, as also to obviate the formation of emulsions with water, it is advantageous to employ fluid oils free from any tendency to thicken on cooling. Also the heavier fractions—those boiling at a high temperature—are to be avoided from the point of view of ready distillation.

Yet all oils, of whatever kind, are bad absorbents, with the result that, under the best conditions, 5 grams of benzol per cb.m. is left in the poor gas from coke-ovens and 11 grams in the richer gas from coal. In spite of the great study which has been given to the practice of debenzolization, the oils employed industrially thus leave about 25 p.ct. of the benzol in the gas. It is in this respect that very considerable improvement has been made by M. Brégeat, whose process is described by M. Grebel as the only advance of any importance in this field during the period of the war. M. Brégeat has patented and installed on an industrial scale in France and allied countries a recovery process which is based chiefly on the use of a special absorbent—namely, one consisting of suitable mixtures of phenol compounds from the distillation of coal tar. The staple components of the mixture are the three isomeric (ortho, meta, and para) cresols with which may be present small quantities of phenol; the whole forming a liquid which is very fluid and remains so at — 18° C., has a density of 1·044, boils at 185° to 203° C., and is very slightly soluble in water.

It has been shown from tests made by the French Admiralty and by experts of the British Government, that this absorbent possesses a great affinity for acetone, alcohol, ethyl acetate and formate, ether, petrol, carbon tetrachloride, carbon bisulphide, and the constituents (benzene, toluene, and xylene) of benzol. According to the inventor, the result is not an ordinary solution of benzol, but the formation of a molecular compound or complex which is readily broken-up again by indirect heating or the injection of steam. At any rate, the absorbent power of the preparation is 6 to 10 p.ct. of its weight of benzol, against 1·5 to 3 p.ct. in the case of oil. The advantages of the process thus consist in the increased efficiency of absorption of the benzol, and, as an outcome of this, a simpler and cheaper plant. Moreover, the cost of working will be still more greatly reduced, even on the basis of the mass of absorbent material being reduced to one-half, as compared with oil, both in absorption and distillation. The economy is effected in heating, cooling, and in motive power for the operation of the liquids.

The Brégeat process during the war has been applied chiefly to the recovery of solvents which otherwise would have been completely or partially lost in such war-time manufactures as those of cordite, doping of aeroplane fabrics, collodionizing of tissues, varnishing of shells, &c. Tables I. and II. show the quantities of such solvents recovered in France during 1918, and in England in 1918 and 1919.

TABLE I.—*Quantities of Ether and Alcohol Recovered by the Brégeat Process in French Explosive Factories in* 1918.

Factory.	Ether, 65° B. Litres.	Alcohol, 96° G.L. Litres.
Sevran	303,901	47,280
Le Ripault (old)	973,759	230,034
Le Ripault (new)	526,106	110,357
Toulouse-Braqueville	275,557	58,968
Pont de Buis	160,012	19,754
Toulouse-Empalot	39,052	4,527
Totals	2,268,387	470,920
Grand total	2,739,307	

TABLE II.—*Quantities of Ether and Alcohol Recovered by the Brégeat Process in English Explosive Works in* 1918 *and* 1919.

Works.	1918.		Jan. 26 to Aug. 2, 1919.	
	Ether, 65° B. Litres.	Alcohol, 96° G.L. Litres.	Ether, 65° B. Litres.	Alcohol, 96° G.L. Litres.
Gretna	1,439,375	2,158,414	285,751	290,630
Misk	1,446,167	1,857,942	—	—
Ardeer	1,273,588	1,497,204	—	—
Pembrey	451,559	476,946	—	—
Totals	4,612,689	5,990,503	285,751	290,630
Grand total	10,603,192		570,381	

On the strength of these results, the Société des Mines de Carmaux, in installing a coke-oven plant, have applied the system to the recovery of benzol from two benches of sixty ovens. This plant will probably be working by the beginning of next year. The process has also rendered practical results in the hands of the cinema firm of Pathé for the recovery of acetone and methyl and amyl alcohols, and of MM. Michaut and Masson and Jenatzy-Le Leux for benzene.

On the strength of the recovery of benzol from the air in the chambers of rubber factories, in which it is present to the amount

of from 45 to 50 grams per cb.m., M. Brégeat guarantees that in new installations the total loss arising from priming, leakage, &c., in absorption will not exceed 0·8 kilo per 1000 cb.m. of gas which has been stripped of tar and naphthalene. The benzol recovered from the gas exceeds 90 p.ct. if the condensing water is at 15° C. On the other hand, it is estimated that the first cost of a complete recovery and rectification plant, which in large gas-works is figured at 10 frs. per 1000 cb.m. annual make, and in medium-sized works at 20 frs., when oil is used, will be reduced by one-third on the system of washing with cresol. The cost of extracting and treating commercial benzol, commonly rated at 45 frs. per 100 kilos in large gas-works, will be reduced by two-thirds. Moreover, the Brégeat absorbent may be substituted for oil with advantage in existing plant.

As with heavy oil, the cresol may be revivified (say) every three or four months in cases where the same lot of cresol does not circulate more than about four times per twenty-four hours in the plant. This revivification can be done with a loss of about 20 p.ct. Apart from the action of the gas, the accumulation of impurities contained in the raw cresol represents about two-thirds of the loss; the remaining third arises from heat changes through contact with the iron or the cast-iron containers.

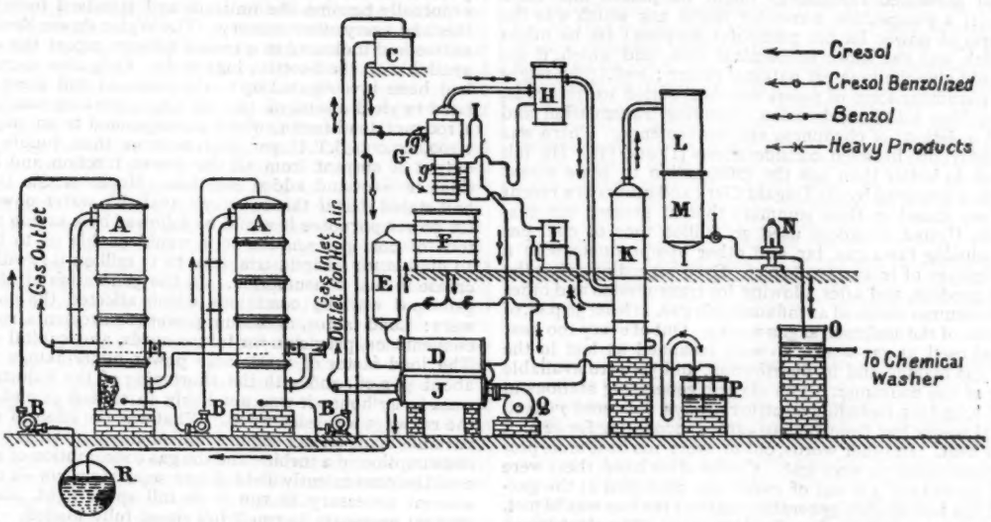
As regards priming of the washers, M. Brégeat's system includes the recovery of cresol, which is carried over by passing the gas through soda solution, and thus obtaining cresylate in a soluble form which has a commercial value for making disinfectants. The cresols forming the absorbent material are of 95 to 99 p.ct. strength, and before the war sold for less than 40 frs. per 100 kilos. At their present price of 70 to 80 frs., they are about three times more costly, weight for weight, than heavy oil.

A description of the Brégeat system would be incomplete without some reference to the features of the plant specially designed for carrying it out. The general arrangement is shown diagrammatically in fig. 3. With the object of reducing the cost and increasing the efficiency of his washers, M. Brégeat provides scrubbers A fitted with spiral members, for which it is claimed that, within a highly compact space, three times the surface-area of contact between the vapours and the absorbent is obtained as compared with that with Raschig rings or similar fittings. This device—the efficiency of which is attributed to the capillary movement of the absorbent—is employed also in the rectification plant, the cost of which is thus brought lower than that of the customary plate columns. M. Grebel, on the strength of experience with Raschig columns, is inclined to think this arrangement would be less economical for the manufacture of highly-refined products, although M. Brégeat cuts up his fittings and separates them by a species of plate.

The Brégeat absorbent takes up any tar which may have passed the Pelouze washer; and part of the volatile matters in this tar is distilled along with the benzol, even when distillation is done at so relatively low a temperature as 140° C. The construction therefore provides for disposing of these heavy products at a point in the plant, and for extracting them in the dephlegmating chamber *g''* of the distillation column G, and then in the lower part of the purifier or separator K. It is claimed that a second rectification before chemical treatment is avoided by this means, and considerable economy of steam effected. The steam consumption per kilo of pure benzene, distilled and rectified in that part of the plant shown to the right of the drawing, is put at 3 kilos. Rectification subsequent to the chemical treatment is done in one or other of the types of apparatus in more or less common use.

The efficient employment of heat has been a chief aim of M. Brégeat in the design of the plant. The cresol saturated with benzol is heated partly in *g''*, in contact with benzol vapours, and partly in D, by the hot debenzolized cresol. A branch pipe of the latter circulates in the lower part of the purifying column K, for the purpose of completing the separation of benzol from heavier products. Cooling of the debenzolized cresol is completed by the chamber J, which is fitted with a system of air-cooling. Other items of the plant which call for mention are the heater and emulsifier E, which serves to complete, in conjunction with indirect steam, the heating of the benzolized cresol before its passage into the column F, and the cooling separator I, which forms an essential part of the installation, since it allows of the extraction of the greater part of the heavy products containing cresol and naphthalene in solution. Heavier products are conveyed directly into the receptacle P; those of lighter density passing to the purifying column K. While there is nothing revolutionary in any of these means, their particular advantages for their respective purposes are specially emphasized by M. Grebel.

M. Grebel's paper is accompanied by some reproductions of photographs showing a Brégeat installation at a National Powder Factory near Tours, where 7000 kilos of ether and alcohol were recovered per twenty-four hours. The plant is practically identical with that for the extraction of benzol from gas. On the general national question of benzol recovery, M. Grebel concludes by reiterating his opinion that it would be a crime to France not to take steps for the recovery of the maximum quantity of benzol from coke-ovens and gas-works, and calls upon the Government to include measures to this end in their programme of reconstruction.



A—Absorption columns. B—Pumps. C—Feed-regulator. D—Heat-exchanger and resuperator. E—Heater and emulsifier. F—Distillation column. G—Dephlegmator. *g'*—Oil extractor. *g''*—Dephlegmator and recuperator. H—Safety Grader. I—Condensing separator. J—Cooler for absorbent oil. K—Purifier. L—Condenser. M—Cooler. N—Outlet valve. O, P—Receiving tanks. Q—Fan. R—Storage tank for absorbent.

Fig. 3.—BENZOL-RECOVERY PLANT, BRÉGEAT SYSTEM, FOR CONTINUOUS OR INTERMITTENT WORKING.

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

A meeting of the Association was held in the Royal Technical College, George Street, Glasgow, on Saturday, when Mr. JAMES DICKSON presided over a large attendance.

The PRESIDENT mentioned that the adjudicators on the papers read during the sessions 1917-18-19 considered the paper by Mr. James Beveridge, on "High-Pressure Distribution," read in the session 1917-18, to be the best paper contributed to the Association during these two sessions; and therefore Mr. Beveridge would be awarded the medal presented by Mr. Wm. Bennett, of Mossley. He also referred to the visit to Messrs. R. & A. Main's works at Falkirk, on March 6, and said that Messrs. Main were anxious that those taking part in the visit should meet at their works at 3 o'clock.

Mr. JOHN M'INTYRE, of the Gas Department, Glasgow, then read a paper (illustrated with lantern slides and diagrams) on "Gas-Engines." This portion of the proceedings will be dealt with later.

Combustion and Conservation of Fuel.—Under the direction of Mr. George Helps, of Nuneaton, there is to be a series of demonstrations in London, in connection with the question of combustion in its relationship to the conservation of fuel. The demonstrations are to take place at the Central Hall, Westminster, on four days, commencing on Tuesday, March 9.

THE RELATIVE MERITS OF GAS AND ELECTRICITY FOR HEATING AND POWER.

INTERESTING DEBATE AT BIRMINGHAM.

[By Our Own Reporter.]

"The Uses of Gas and Electricity for Heating and Power" formed the subject of a debate at the University of Birmingham on Feb. 5. The English theatre was crowded with representative gas and electrical engineers of Birmingham and the Midlands, industrial chemists, mechanical engineers, and metallurgists. The event was a joint meeting of the Midland Junior Gas Association and the South Midland Centre of the Institution of Electrical Engineers. Mr. E. C. R. MARKS, M.I.M.E., presided.

The several subjects for debate were:

1.—The utilization of fuel for the generation of power, and a general survey of the title of debate.

2.—The industrial application of the two agents (furnaces in particular).

3.—Domestic appliances (other than lighting).

4.—Transmission or distribution of power.

By mutual agreement, the question of lighting, either by gas or electricity, was excluded from the discussion.

UTILIZATION OF FUEL FOR THE GENERATION OF POWER.

Dr. E. W. SMITH, the Chief Chemist of the Birmingham Gas Department, expressed the hope that the various subjects to be considered would be dealt with from the point of view of national economy rather from that as they concerned the individual industry with which a speaker was connected. It was obviously difficult to discuss such a matter, because anyone who thought about it realized that neither industry could, with justice, suggest that there was not room for the other. Neither could either industry, gas or electricity, suggest that the one or the other should not endeavour to improve its efficiency, and try to oust the other from the field. In a discussion on a comparison between the two industries as to the general application of a particular form of power in relation to present-day needs, the questions which presented themselves might be placed into three divisions—(1) a prospective consumer might ask which was the cheaper form of power for his particular purpose; (2) he might inquire which was the more economical form and which, if extended, would give the greatest national return; and (3) he might ask which particular form of power was best suited to his needs, taking everything into consideration, including transmission and the general questions of cheapness and convenience. There was a distinct difference between considerations (1) and (3). He felt he could not do better than use the information to some extent that had been prepared by Sir Dugald Clerk and others in a recent report. They stated in their summary that at present the gas-works of the United Kingdom used 20 million tons of coal per annum, producing town gas, tar, and other bye-products, with a thermal efficiency of from 70 to 80 p.ct. Even regarding gas as the only useful product, and after allowing for transmission and other losses, the consumer received as inflammable gas, at least 50 p.ct. of the heat value of the coal used at gas-works. Out of every 100 heat units of coal used at gas-works, 50 were reckoned as lost in the process of gas making and in distribution, and 50 were available for the use of the consumer. The electric generating stations in the United Kingdom, including electric railways, delivered 7·6 p.ct. —the actual power lost from various causes accounting for 92 p.ct. of the total heat. In other words, out of every 100 heat units produced by combustion 92 were lost. On the other hand, there were distributed 50 units of gas out of every 100 produced at the gas-works. At the best electric generating stations the loss was 88 p.ct. —only 12 p.ct. being delivered to the consumer. The electricians promise for future super-stations a delivery of 17·6 p.ct. Here is a loss of 82·4 p.ct. At present, the best existing gas practice delivers over 60 p.ct. of the heat in the coal used at gas-works to produce it, and only less than 40 p.ct. in the work of generation and distribution to the consumer. In the near future, the thermal loss should be reduced to 25 p.ct. Except where temperatures above 1700° were required, the production of electricity was extremely wasteful; while in the great mass of heating operations gas was many times superior. As to lighting and power production, electricity promised results which compared more favourably with gas. But even in the latter domain, the highest over-all efficiency attained by electricity fell behind. Again, the prospective economies in the production of gas, and the advantageous use of the incandescent mantle, rendered any point as to monopoly claims, so far as electricity was concerned, quite unjustifiable. While it was admitted that electricity afforded an easy means for producing light, and was filling an increasingly important field in some classes of work where very high temperatures were required, it was idle to suppose that the current could, in a general sense, displace gas for heat, light, or power purposes. There were, moreover, many other considerations if a just estimate were to be made of the part which gas played in the national economy. Apart from the uses of gas for heating, lighting, and power purposes, the question of bye-products, which were produced in large quantities, must be considered. Some electrical undertakings used coke for generating steam, and even coke-dust produced on the gas-works was highly economical for raising steam for the production of current. The ammonia industry depended largely upon the gas industry; while from gas residuals, fertilizers, high explosives, &c., were obtained, and the indications were that there would be further developments in this direction. Bye-products from tar included dyes, medicines, scents, &c., as well as fuel oil. It was the practice of gas undertakings which were progressive to wash the pure gas for benzol for motor spirit; and at one of the Birmingham gas-works 1000 gallons of benzol were produced per day. It now appeared that experiments for the production of alcohol from coal gas would be successful; and if this anticipation were realized, it would be obtained in equal quantities to the present quantities of benzol. Lastly, there was the production of cyanide, which was of importance in the work of the colonial gold mines. In conclusion, he expressed the hope that the debate would have the effect of enabling them better to appreciate the necessity of both industries, from a national point of view, and instructing them upon some matters of value to the existence of both.

Mr. F. FORREST, M.I.E.E. (Chief Assistant Engineer to the Birmingham Corporation Electric Supply Department), speaking for electricity, urged that, in considering any national power supply undertaking, the power to be supplied must be of such a character and nature that it could be economically generated by any or all of the natural power resources of the country—whether they took the form of coal deposits or oil, wells or waterfalls, or other potential sources of power. Gas could be generated only from carbonaceous material. Therefore it could only make use of one of such resources, and the one they were most anxious to conserve. Electricity, on the other hand, could be economically generated from coal or coal gas, or oil (picturesquely described as "white coal" by the French), or it could be generated by means of the waste heat resulting from other manufacturing processes. If electrical power could be supplied as cheaply as gas power, and proved as satisfactory and convenient to use, it must of necessity eventually become the uniform and standard form of power in this and every other country. The Water Power Resources Committee had indicated in a recent interim report the water power available on the Scottish highlands. Only nine sources of power had been investigated up to the present; and these were calculated to yield a total of 183,500 E.H.P., working continuously with a 100 p.ct. load factor, which corresponded to an output of about 1,200,000,000 B.T.U. per year, or more than double the present output of current from all the power, traction, and lighting stations in Scotland added together. Moreover, Sir Dugald Clerk had stated that if this country's available water power was used for power purposes it would be followed by a saving of 26 million tons of coal per annum, or it would enable us to increase our 10 million H.P. of industrial load to 13 million H.P. without any increase in fuel consumption. In the generation of electricity the principal working conditions which affected the cost of power were: Load factor, maximum power requirements, reliability and convenience, provision for future needs, and capital expenditure. The load factor of most large power undertakings was usually about 33 p.ct., and with the shortening of the industrial working week to 47 hours it was not likely to exceed 38 p.ct., even when the railways were electrified. What was the effect of reduced and variable loads on gas-engines and on steam turbines? The steam consumption of a turbine and the gas consumption of a gas-engine could be conveniently divided into separate parts—a certain fixed amount necessary to run it at full speed light, and a further amount necessary to run it full speed fully loaded. In the case of a steam-turbine, the consumption running light was only about 8 or 10 p.ct. of the full-load consumption; whereas in the case of the gas-engine the light-load consumption was about 30 p.ct. of the full-load consumption. This high initial consumption had an important effect on the efficiency of a gas-engine; and at ordinary working-load factors the thermal efficiency of a large steam-turbine was equal to that of a gas-engine. This fact went far to account for the preference shown for steam-turbines in large electric power stations. Steam-turbines, unlike gas-engines, could be heavily overloaded for long periods without danger. They were being made in sizes up to 30,000 KW. each, which was much larger than anything gas-engines had yet attained. They were found to be much more economical in the larger sizes; whereas gas-engines were most economical in the smaller sizes. The initial capital cost of turbine plant and its adjuncts amounted to only 70 p.ct. of the capital cost of gas-engine plant and its adjuncts. The cost of labour necessary to run a large gas-engine plant was much greater than that required to run a turbine plant of equal output; while the cost of oil and engine-room stores was at least three times as heavy as that of a turbine plant. The gas-engine, even when fitted with an extra heavy flywheel, had a considerable variation of angular velocity throughout its stroke. This cyclic irregularity made it a very much less satisfactory prime mover than the turbine, the angular velocity of which was

absolutely constant. General experience indicated that for large outputs the turbine was the better. Even in isolated cases, where it could be shown by calculation that the cost of generating power by gas-engines would be less than if turbines were used, experienced engineers had adopted the turbine for its reliability and convenience, just as experienced railway engineers had practically abandoned compound locomotives and gone back to simple engines. Electrical engineers were fully alive to the need of utilizing our national coal resources to the greatest national advantage; and while they had not found the gas-engine satisfactory, they had by no means set their face against the gasification of coal for power purposes with a view to recovering some of the 700 bye-products obtainable. This was why so much attention was being given by them to-day to the question of gas-firing of boilers. They wished to combine the efficiency and reliability and convenience of the steam-turbine with some form of bye-product recovery plant if it could be shown that such a combination was commercially sound or to the national advantage. He insisted that every process of coal distillation for boiler firing involved considerable heat losses, and necessitated the consumption of larger quantities of coal than if the coal were burnt directly under the boilers. The extra heat lost must be compensated for by the production of bye-products or substances of greater value than the heat lost The present method of burning raw coal directly under boilers and using steam-turbines was the cheapest and most satisfactory way of generating large amounts of power.

INDUSTRIAL APPLICATION OF GAS AND ELECTRICITY.

The next phase of the debate was in relation to the industrial application of the two agents—furnaces in particular.

Dr. C. M. WALTER (of the Industrial Research Laboratory of the Birmingham Gas Department) presented the case for gas. He pointed out that the industrial applications of gas and electricity covered such a huge field that when considering the advantages or otherwise of the two agents, one was bound to find that, for certain industrial operations, one or the other was particularly adapted for the work. As examples, they might take the welding of small components and sheet metals, for which electricity was more especially adapted; and, again, the carburizing or reheating of large masses of metal, where gas must inevitably be the heating agent. The fact that the electric furnace of the arc or induction type for steel smelting was fast gaining favour in this country was no argument in favour of the application of the electric furnace to the more general industrial operations, such as metal melting, forging, annealing, re-heating, japanning, lacquering, ceramic firing, enamelling, &c., in which either agent could be employed. He suggested that the electric furnace had hardly made its *début*, and, in the light of the huge improvements that had taken place in recent years in the designs of gas-furnaces, and the consequent increase in thermal efficiency, it would appear that electricity as an industrial heating agent would only exist on paper. As proof, it was necessary only to consider the comparative costs of the two agents for carrying out the operations referred to. Prior to the war, the cost of doing such work in the electric furnace was at least three times as great as in the case of the gas-furnace. The days of gas-furnaces with a thermal efficiency of 10 or 15 p.ct. had gone. Furnaces for forging and re-heating were now designed on recuperative principles, with efficiencies as high as 40 p.ct. The electric furnace remained at its old figure of 50 or 60 p.ct. Owing to the increase in the efficiency of the gas-furnace (having regard to the fact that the cost of current and gas at the consumers' premises were practically in the same ratio as before the war), electricity was left a long way behind. While admitting that the electric furnace had certain possibilities, he thought its application would be confined to the more specialized industries, and to small work which was carried out in laboratories. The application of alternating current had done much to bring the electric furnace to the front; but here, again, owing to the large capital outlay necessary to cover switch, gear, transformers, &c., and the increased cost of heating, its use, in many cases was rendered quite impossible.

Mr. F. J. MOFFETT, Consulting Electrical Engineer, Birmingham, replied, dealing with the principal distinquishing features of the electric as compared with the gas furnace. To utilize gas for heating, combustion must take place and only a fraction of the total heat units in the gas could be said to be utilized in heating the charge—the remainder of the heat being carried off by the waste gases and the excess air. Electrical energy, which in this country was generated as a rule by the combustion of fuel in a boiler furnace or the cylinders of an internal combustion engine, was capable of being converted into heat energy even in a vacuum, and the losses inseparable from the combustion of gas did not occur. The efficiency of conversion from one to the other form of energy was practically 100 p.ct. When heat was produced by combustion, there were usually certain impurities present—such as sulphur and carbon—which were liable to be absorbed by the charge; but in the conversion of electric into heat energy no such impurities were produced. To compare a gas-heated furnace therefore on the same basis with an electric furnace, the former should be so designed that the charge was enclosed in a container, such as a crucible or muffle, to protect it from contamination by the products of combustion. Since the heat must be conducted in such a furnace from the outside to the inside, the temperature gradient would be greater than in a furnace where the hot gases were directly in contact with the charge. Consequently, the heat losses would be still further increased owing to the higher temperature of the waste gases. In an electric furnace, it was very usual to effect the heating from inside, as in the arc and induction furnace and in some types of resistance furnaces. In a gas-heated crucible furnace, the heat was applied externally; and in the electric furnace, internally. The efficiency of a furnace might be defined as the ratio of the heat units usefully employed to the total heat units in the gas used or in the electrical energy supplied. In other words, it was inversely proportional to the heat losses. It was impossible to avoid great heat losses in any form of combustion furnace, quite apart from the losses from the body of the furnace; whereas, in an electric furnace, the losses could be confined very closely to those due to radiation and conduction. By the use of non-conducting materials, the losses under this head could be kept very low. As a result, the efficiency of the electric furnace was very high. In practice, it frequently reached 85 p.ct.; but the average working efficiency could be taken at 75 p.ct. He did not think it would be wide of the mark to put down the average working efficiency of a gas-furnace at 25 p.ct.; so that the losses in the first case were only one-third of those in the second. A valuable feature of the electric furnace was the high temperature attainable. The temperature of the arc was about 3500° C.; so that temperatures of 2000° C. and upwards could be easily reached. In fact, the limit in practice was the fusing point of the refractories available for lining the shell. For certain processes, such as the manufacture of graphite or carborundum, a temperature higher than could be reached by the combustion of fuel was required; and the electric furnace was the only solution. For other purposes, like refining steel and the melting of steel alloys, a high temperature was always advantageous. In steel refining the reactions between the charge and the flux were much facilitated by a high temperature. He urged, too, that with a fuel-heated furnace there was a commercial limit to the temperature which could be reached, owing to the heat carried away by the waste gases; and there was a physical limit to the temperature obtainable in a combustion furnace, because, at a certain point, the components of the gas ceased to combine with the oxygen of the air. The highest temperature in a combustion furnace without recuperation could safely be put at from 1500° to 1800° C. For many metallurgical processes a neutral or reducing atmosphere was desirable. He referred to the smelting of zinc, the melting of aluminium, and the refining of steel. The electric furnace was particularly suitable for steel melting and refining, for the reduction of iron ore, and for the preparation of elements like phosphorus and aluminium, in which electrolytic action was necessary. Such elements could not be produced in a gas-furnace. The resistance type of furnace was most suitable for melting non-ferrous metals. For the heat treatment of steel, electric furnaces were successful—one of the best known being the Wild-Barfield, which had a wire-wound heating element. He concluded by observing that at a recent meeting of the Institution of Electrical Engineers Dr. Walter described a furnace, electrically heated, of his own design. This seemed to him (the speaker) a delicate compliment to electricity. He protested against the distorted view of some gas and electric engineers that their interests were always opposed. There was, on the contrary, plenty of room for co-operation; and he instanced a case with which he was in touch. Gas was generated in a bituminous producer with bye-product recovery; and the gas was supplied to gas-engines driving electric generators. The current was supplied to electric steel furnaces; and the cost per unit was in the neighbourhood of 0·4d.—a very moderate price under present conditions.

DOMESTIC APPLIANCES.

Mr. R. J. ROGERS (Fittings Superintendent, Birmingham Corporation Gas Department) submitted the case for gas domestic appliances. His contention was that, for cooking and heating in such appliances, gas was the more efficient and economical. In fact, electric cooking and heating was not a commercial proposition, neither would it be while electricity had to be generated from coal. White coal, to which reference had been made, was not available. Gas-cookers, fires, and water-heaters were in universal use because of their efficiency and economy. The thermal value obtained from one unit of electrical energy on complete conversion to heat was 3420 B.Th.U.; while, taking the basis of 1 c.ft. of gas as giving 470 B.Th.U., 7·27 c.ft. of gas was required to provide an equal number of B.Th.U. as was obtained from one unit of electricity. Taking Birmingham prices, with electricity at 2·66d. per unit and gas at 3s. 10d. per 1000 c.ft., the cost of gas would be 0·33d., as against 2·66d. for electricity. Without taking into account the efficiencies of various appliances, eight times more heat could be obtained from gas than from electricity at the prices ruling in Birmingham to-day. One could not get away from the B.Th.U. law in considering the heating value of gas and electricity. Gas and electrical appliances gave varying efficiencies. As to water heating, it may be taken that the electrical heaters gave 90 p.ct. efficiency, and the gas-heated apparatus, in the form of a geyser, 85 p.ct. efficiency, though some geysers gave higher efficiencies. The cost by electrical appliances was 7½ times more than gas apparatus. Regarding room-warming, the electrical method was usually by means of convectors or radiators. If the efficiency of such heaters was conceded to be 100 p.ct., it would be seen that electric heating cost six times as much as gas-fires, giving 75 p.ct. efficiency. The electric heater did not assist ventilation or air change. Electricians claimed greater efficiency for their cooking apparatus, as they said their heat

losses were less; but this contention applied principally to the oven. Their hot-plate elements were usually so protected that there was great loss of heat owing to lack of direct contact between them and the cooking utensils, and their efficiency was thereby much reduced. Therefore, if they were given 20 p.ct. better general efficiency, it would be more than a liberal allowance. Even at this, the cost of current for cooking purposes, at 2·66d. per unit, was more than five times that of gas at 3s. 10d. per 1000 c.ft. Besides the excessive cost of fuel, the drawbacks to electricity for cooking were: High cost of installation, high and uncertain cost of upkeep, difficulty of management, lack of facilities for hot-plate work, and slowness of operation. The claim made for electricity as to the saving of meat shrinkage was unfounded. At the Southampton Docks, National Kitchens were provided; and in addition to the existing gas appliances, electric cooking-stoves and tea urns were fitted. Experience showed, however, that the latter were scarcely ever used. In a "Handbook" on National Kitchens, it was stated that the Division's experience of electricity for cooking had been anything but favourable; while "gas appliances were more constantly reliable and much cheaper to instal and maintain, and they consumed less fuel."

Mr. N. B. ROSHER, O.B.E., M.I.E.E. (Consulting Engineer, Birmingham), put forward the standpoint of electricity. He said that lifts, vacuum cleaners, boot and knife cleaning machines, sewing machines, and ventilation by fans could only be efficiently worked by electricity. Last year, 600,000 electric vacuum cleaners were sold in America. Other domestic uses, apart from lighting, were heating, ironing, and cooking. Here, gas was an active competitor with electricity. His argument was that the economic case for electricity was not nearly so bad, or the case for gas so good, as Sir Dugald Clerk had recently declared. It was beginning to be realized that the domestic coal-fire and cooking-range were hopelessly inefficient; but few people realized that the efficiency was so low as 3 p.ct. Granted that many more heat units could be produced for 1d. from coal direct than from electricity, the net or useful result was largely modified by the fact that 97 p.ct. of the heat in the coal-fire was wasted, and only 3 p.ct. usefully employed. He insisted that coal and gas heating of ovens was wasteful because of the great excess of air used in combustion; while there was no such waste with electricity, though waste occurred in the generating station. If gas were used economically—*i.e.*, with only the bare minimum of air required for combustion—the temperature would be about 3500° Fahr., and the food in cooking would be ruined. To avoid this, the temperature (and therefore the efficiency) had to be reduced to about 500° Fahr. by the admission of ten times the amount of air actually necessary for combustion. A balance must be maintained between scientific efficiency and practical utility. In a lecture given by an independent authority (Mr. G. H. Barker), at University College, London, the efficiency of various ovens were given as: Coal-fired oven, 3 p.ct.; gas cooker, 11 p.ct.; electric cooker, 21 p.ct. The speaker, however, considered 19 p.ct. to be more correct for the electric cooker. The tendency with gas engineers appeared to be rather to compare the heat units they could supply for 1d. with the heat units that electrical engineers could give for the same sum. To do this was to mislead the uninstructed man-in-the-street, as he naturally imagined that he would be able to use all the heat units. In the case of electricity, he was able usefully to utilize from 90 to 95 p.ct. in the oven; but with gas he must waste fully 90 p.ct. There still remained the efficiency of the cook; but her chances of impairing efficiency was less with the electric system than with either gas or coal cooking, for the reason that the heating agent was constant in value. A unit of electricity, no matter how or where generated, contained 3410 heat units; whereas 1000 c.ft. of gas might contain anything from 450 to 650 per c.ft. Loss of weight occurred when a joint was cooked in an oven. The percentage loss in different types of ovens, according to Mr. Barker, was as follows: Totally enclosed oven (electric) loss 10 p.ct.; ventilated oven (coal), loss 15 p.ct.; freely ventilated oven (gas), loss 20 p.ct. Mrs. Beeton's cookery book gave the loss with coal or gas cooking as being from 25 to 35 p.ct. Assuming the relative correctness of the figures as given by an impartial authority, the saving in weight of meat cooked was of more importance to the housekeeper than the cost of fuel for cooking. The correct solution of the hot-water problem was the installation of a small separate coke-fired boiler, which could be run for a few shillings per week, and which would incidentally burn-up the house rubbish. If the cost of gas and electricity were in any way comparable, he had no doubt that electricity would win every time, because of its inherent advantages, which included certainty of performance, ease of control and operation, absence of fumes (no ventilation required), cleanliness, and portability. Gas cooking had made notable headway because: (1) It was first in the field; (2) was an improvement over coal-fires; (3) because of the low rental at which cookers were supplied; and (4), because of the excellent business organization of gas undertakings. Electricity had much leeway to make up. First the lighting load and then the power load increased so rapidly that electric cooking and other domestic uses were not pushed or given the attention they deserved. This was being rapidly altered, and a large increase in the domestic use of electricity was to be expected.

TRANSMISSION OR DISTRIBUTION OF POWER.

Mr. R. G. MARSH (Fittings Engineer, Birmingham Corporation Gas Department) spoke upon the transmission or distribution of power from the gas point of view. In dealing with the commercial aspect of the question, he said that, on the present price ruling in Birmingham, power for power gas was cheaper than electricity. If they took the instance of a manufacturer requiring 50 H.P. to drive his workshops, and assuming a load factor of 50 p.ct., on which, allowing 26 c.ft. per H.P. hour per annum of 3000 hours with gas at 3s. 6d. per 1000 c.ft., his annual gas bill would be £341. Allowing for cost of attendance a further £50 per annum, for oil, spares, &c., a further £50, and for interest and depreciation 10 p.ct. on (say) £600, the cost of the engine another £60, his total bill would come to £501. For the same power, the cost of current alone, at 2½d. per unit, for a 50 H.P. motor would be £780—that was, allowing nothing for attendance, oil, depreciation, or interest in respect of the motor. In certain special cases electric drive presented advantages to manufacturers to whom for various reasons line-shafting was unsuitable. It had to be remembered, however, that the loss in efficiency due to conversion of energy in dynamos and motors was considerably higher than the losses due to line-shafting properly arranged. Therefore, mechanical drives were preferable wherever possible. Wherever electrical drives were necessary for reasons of convenience, it would pay to install a gas-driven electric generator. Another important aspect was that in connection with the utilization of waste heat from the engine. The thermal efficiency of a gas-engine was usually 30 p.ct.; 16 p.ct. of the remainder was recoverable and was being recovered on every-day working results, raising the over-all efficiency of the engine to 46 p.ct. The heating was being applied for a variety of uses, including steam raising, &c.; and in the case of a 450 H.P. engine working at full load, it would give, in the form of recovered waste heat, an amount which, if it had to be generated by a coke-boiler (coke at £2 10s. per ton) would cost over £800 per annum.

Mr. W. W. WOOD, A.M.I.E.E. (of the General Electric Company, Birmingham), urged that electrical energy could be efficiently and conveniently transmitted over practically any distance required for purposes of light, power, heat, or chemical action. An American company had during the last five years transmitted 1600 million H.P. hours a distance of 240 miles with an average efficiency of 87½ p.ct. This worked-out as an average amount of power transmitted of about 36,500 H.P. The load factor was 5 p.ct.; so that the maximum load was well over 70,000 H.P. The extensive use of the electric motor did not rely upon the question of efficiency alone, but depended greatly on its convenience. It could be easily started by unskilled labour in a few seconds against any load; it could be stopped quickly and easily; was always ready for service; and could develop two or three times full load torque for short periods, if required, without injury or appreciable slowing-up.

DISCUSSION.

The CHAIRMAN expressed the view that it was most important that municipal gas and electricity undertakings should be under the administration of a Joint Committee. There was a distinct advantage when meeting the Government in pulling at the end of one rope, and not at the two ends, as now.

Dr. GARRARD said there was a consensus of opinion that there was room both for gas and electrical engineering, and efforts to ensure co-operation should be made. There was no question as to the tremendous service electricity was giving to the country, in that a low-grade coal, unsuitable for gas making, could be used. Healthy competition was a good stimulus to the engineer working on either side. Sir Dugald Clerk's case was not convincing, because he did not take into consideration the question of the efficiency of the apparatus. Electrical equipment was distinctly the more efficient. Electricity played a great part in the utilization of various sources of power which previously went to waste. The steam-turbine was most efficient; and its great value in the modern power-house was testified to by the Nitrogen Products Committee. Each agent had its special applications; and he thought this point should be concentrated upon. As to the use of electricity being unsuitable for japanning, a large American company had discarded gas for the electric japanning oven. Electricity was peculiarly suitable for high temperature work, for steel furnaces and chemical processes, and great progress had been made in this direction at Sheffield. Electric cooking was a commercial proposition, and for the appliances makers were very heavily booked forward. In the Navy electric cooking was most successful. The ordinary domestic appliances required an electric motor, if a motor at all. As to motors for power purposes, it was significant that all modern works were equipped with electrical power, and, further, that the Birmingham Gas-Works were electrically driven.

Dr. E. W. SMITH stated that the Birmingham Gas Department merely produced electric current as a bye-product from gas; and full advantage was also taken of the waste steam exhaust for heating the ovens. He was glad to note the recognition that each agent had a definite position, and for certain purposes an advantage over the other. Gas could be made from various kinds of fuel (some of it other than coal). It was not correct to regard the production of gas as the first consideration. The cost was the first consideration, and gas-works should be regarded as a chemical works, at which the price of gas depended upon the value of the bye-products obtained.

No division, for or against, was taken; and the interesting proceedings concluded with a vote of thanks to the Chairman.

A joint visit of the English Junior Gas Associations to the British Industries Fair at Castle Bromwich has been arranged for next Saturday, Feb. 28. The inspection will be preceded by lunch at the Imperial Hotel, where Mr. C. Carington Barber (the President of the Midland Junior Gas Association) will receive the visitors, and Dr. E. W. Smith will address the gathering.

SIXTY YEARS AGO.

[From the "Journal" for February, 1860.]

The Lime-Light Company.—The Lime-Light Company have succeeded in gaining extensive notice of their project to supply that beautiful light to the public at half the cost of common coal gas; but this extended publicity has exposed more completely the fallacy of the calculations on which the scheme is founded. In a communication from Mr. Denny Lane, of Cork, the plan is carefully examined; and the statements of the promoters are ably and searchingly analyzed, for the purpose of showing—even by their own representations—that the cost of the lime-light would be greater than that of coal gas. The results of Mr. Lane's analysis are that the oxygen costs £3 15s. 7d. per 1000 c.ft., and the hydrogen, when pure hydrogen is consumed, £2 0s. 2d. per 1000 c.ft. The consumption of the two gases would, indeed, be very much less than that of coal gas, to produce an equivalent light—the proportionate quantities (given by the promoters,) being 6·53 c.ft. of oxygen and 12·4 c.ft. of hydrogen per hour to produce the light of 1167 wax candles. Yet the value of these comparatively small quantities of the gases, when added to the cost of the lime, would amount to more than the price of a volume of common coal gas requisite to give an equal light, and to much more than the cost of cannel gas. Another important point noticed by Mr. Lane is the loss by leakage, in two separate mains, of such costly gases, the amount of which would be very much greater, in proportion to the quantity consumed, than in the existing gas-mains. This proposed mode of illumination is, indeed, entirely worthless as an economical substitute for coal gas for general purposes; and the extensive notice the project has received is chiefly owing to the respectability of the parties under whose auspices it has been introduced.

The Hills Oxide Purification Patent.—The Court of Exchequer has at length given its judgment in Mr. Hills' favour upon every point raised in the application for a new trial of the action brought by him against the London Gas Company for infringement of his patent of 1849, for the purification of gas by oxide of iron prepared in a certain manner, and mixed with certain substances. The Court has thus deliberately affirmed the novelty and the legality of the patent, after a most patient and prolonged investigation. We confess we anticipated a different result. But we must bow to the verdict of such a tribunal; and, as Mr. Hills has thus fully established his rights, we feel it to be due to him to say that we have been misled by the strong opinions given upon the question by the writer of the "Chemistry of Gas Lighting," and that Mr. Hills at least is not one of those we recently characterized as the possessors of illusory patents, which are worthless, except as a means of extortion in enabling their holders fraudulently to threaten actions of infringement. We unhesitatingly admit the completeness of his triumph.

MIDLAND JUNIOR GAS ASSOCIATION.

After the proceedings already reported at the meeting of the Midland Junior Gas Association on the 12th inst., Mr. W. P. TIMBRELL, of the Accountant's Office, Birmingham Gas Department, read a "paperette" entitled:

FROM SERVICE PIPE TO NOMINAL LEDGER.

During the past two or three years, it has been a common procedure, in papers dealing with the accounts of a gas undertaking, to take as a basis the principal items appearing on the debit side of the revenue account, in conjunction with the charges and credits in respect of residuals and fittings. Some notable examples of this practice are to be found in the lecture given by our Accountant, Mr. Edward Cooke, at the School of Economics (University of London), and also in his paper given before the members of this Association. To-night, however, I propose to strike-out in a new direction, and place before you a brief description of how the various charges which are incurred by the consumer (from the laying of the service-pipe) are collected through the various books of the undertaking till they arrive in the nominal ledger, and thus form an integral part of the annual balance-sheet.

I will ask you to imagine that a would-be consumer has made an application for a supply of gas by ordinary meter. The clerk in attendance takes full particulars (on an appropriate form) of name and address, whether a service pipe is laid on to the premises, size of meter required, and other essential information which, when completed, is signed by the applicant and becomes the official order for the department to execute the work, and charge to him the cost, together with the quarterly charge for gas consumed. If the applicant expresses a desire to secure from the department the necessary pendants, brackets, and gas-fires to fit up the house, he is referred to the show-room, where he can suit his own tastes and the length of his purse, assisted by a trained staff of expert salesmen who are ready with suggestions and ideas to secure for him maximum efficiency. Suitable articles having been obtained, the salesman enters them through an order book, which, when signed by the customer, gives the authority to supply and fix. In the event of the customer desiring to have apparatus on permanent hire or hire-purchase terms, the order for these goods is taken separately on special agreement forms, which set out the full terms of the contract entered into.

At this stage, assuming that a hiring agreement has been signed, we have in our possession three distinct orders—the first to give a supply of gas, the second to supply and fix fittings, and the third to provide apparatus on hire. Dealing with them in the same order, the first step is to give a supply of gas. A ticket, which is in effect an instruction to the fittings section to proceed with the work, is issued by the clerk who received the order from the consumer. The tickets are issued in duplicate, and are numbered consecutively. After giving the name and address, they read "Fix meter, service tap, and connections;" and space is provided for any additional instructions to be inserted. In addition, they also provide sections in which the Corporation badge number of the meter and index reading on the day of issue are to be inserted, together with the date the meter is actually fixed on the consumer's premises. The back of the ticket is used in the stores for inserting details of any material issued to the fitter for the purpose of carrying out the work. In all cases where a service-pipe from the main is required, an order is issued to the distributing engineer to carry out the work; and the number of such service order is noted on the ticket. The ticket being now complete so far as the office is concerned, both copies are detached from the book—one going to the fittings account desk, to be preserved as an office record of work in hand, and, incidentally, becoming a useful reminder of the length of time that a ticket has been outstanding in the fittings department. The second copy is forwarded to the fittings department, so that the necessary work may be executed. On arrival in this section, an order is issued to the meter stores to deliver the meter. These meter orders are issued in triplicate; two copies being despatched to the meter stores—one of which they retain for their own records, while the second is returned to the fittings department after the meter has been delivered. This gives the date of delivery, size, number, and index reading of the meter. The third copy is retained by the fittings department until such time as its companion copy is received from the meter stores, when the two forms are attached and sent to the meter posting desk in the general office. It will be noted that the third copies, while remaining in the fittings department, form a complete index of work awaiting delivery of meters.

Upon the arrival of the forms at the meter posting desk, a leaf, punched to fit in a loose-leaf cover, is made out, giving name and address, size and number of meter, &c., for insertion in the state book, the necessary entries are made in the meter stock register, the meter is duly posted to its appropriate place in the rent rolls, and at this point the new account first appears in the books of the undertaking.

At this stage I think we may take up the story of the second order given by the customer—namely, the one to supply and fix fittings as selected—in order that the connection between the latter order and the preceding one (to give a supply of gas) may be fully appreciated. When the showroom salesman booked the consumer's order for fittings, he would ascertain whether the customer was consuming gas at the address given, or, if not, whether a meter had been ordered. In the case under review the result of these inquiries would lead him to the ticket issued for fixing the meter; and in the space provided for additional instructions the words "Fix fittings, see show-room order ——" would be inserted as an indication to the fitter executing the work that, in addition to the fixing of the meter, further orders had been received in the show-room, and that he must apply there for instructions before proceeding to the customer's premises.

Upon the fitter presenting himself in the show-room stores, the selected fittings would be booked on to the back of the ticket, in the space provided for materials; a copy of the entry by means of carbon papers being retained in a rough book. A similar procedure is adopted in the case of other materials required to execute the work. As the work proceeds, the fitter's and assistant's time is recorded daily from the fitter's time sheet upon the face of the ticket, and a daily statement showing the number of hours worked is sent to the customer. At the conclusion of the job, the ticket is passed by the district inspector, and sent forward to the fittings account desk for the materials and labour to be priced.

At this desk it would be noted, from the instructions on the face of the ticket, that a service-pipe had also been ordered. The greater part of this work is carried out at the expense of the department. Should, however, a customer incur a charge, the amount would be picked up through an order cost book, in which the distribution department record all charges against consumers. The pricing-out of the various items is done by a senior clerk, and a complete entry is made in the fittings day book, and an invoice made out for despatch to the customer. This work is accomplished by Remington-Wahl typewriters, which at one operation make out the invoice and copy the details by means of carbons into the day book, in addition to which, they add together the various items making-up the invoice and the totals, in order to arrive at the grand total of the day book. The use of these invoicing machines effects a great saving of time over ordinary clerical methods, not only in writing, but also in the addition of figures; while there is an absolute guarantee that the account rendered to the consumer is an exact copy of the entries in the day book. It now only remains for the duplicate of the ticket to be withdrawn from the file in the general office, in which it records that the job is outstanding, for attachment to the original, and the whole can then be filed in numerical order for future reference if required.

The third order placed by the customer was for the fixing of apparatus, such as a cooking stove or gas-fire fixed on hire terms. Whether these are permanent hire or hire purchase, the preliminaries are practically the same. After a visit to the premises has been made by a district inspector to take measurements, an order to deliver, similar to that issued for the meter, is made out and forwarded to the stove store, so that delivery of the apparatus required may be effected. Upon the return of the order from the stove store, the fittings department proceeds with the work, and upon its completion forwards the order to the stoves on hire section, who, in turn, enter full details in the hiring journal, together with the amount to be charged each quarter, as shown in the agreement which was signed in the first instance.

Having now executed the whole of the orders given by the customer, the next step will be to build-up and render a complete account. You will remember that we followed the meter as far as the rent rolls; and these books, which are ledgers worked in column form, provide the means by which all quarterly charges that may be incurred by a consumer are gathered together.

At this point, I may mention that charges for coke delivered are recorded in a day book, while those in respect of burner maintenance, meter rents, &c., are entered into journals; the main features of each system being very similar to that adopted in the case of the fittings day book and hiring journal respectively.

The rent rolls are loose-leaf books; thus enabling the addressograph to print names and addresses. Each opening shows one quarter's account; and by the insertion of three short leaves, the books are made to last one year. Arranged in street order, and bound together to coincide with the wards of the city, they provide columns for the following information in the order named: Address and name of consumer, size of meter, states of meter, gas consumed, money columns for recording arrears brought forward, value of gas consumed, and charges on account of fittings, burner maintenance, apparatus on hire, meter-rents, lamps on hire, and coke sales. All the money columns are cross-cast into a total, and so show the complete debit against the consumer. Further columns are provided for the posting of cash paid and discount allowed; the page being completed by space being given for the recording of notices issued to enforce payment. During each quarter, the items entered in the various day books and journals previously referred to are posted in their respective columns against the consumer by the clerk having charge of the rent roll.

At the end of each quarter, the various columns are cast, and the total must, of course, balance with that of the day book or journal governing the particular section, thereby proving that every item has been debited against a consumer, and also that the correct amount has been posted. The state of the meter having been taken, it is copied into the rent roll, and the consumption and value of gas consumed columns filled in. Meter readings are taken during the last three weeks of a quarter. The state books are on the loose-leaf principle, each meter having a separate leaf. This system has many advantages over bound books; one of the chief being that it is possible to insert the sheets for new accounts or additional meters, each in its proper place, instead of interlining items or entering them at the end of each street, which is almost sure to happen if a bound book is used, no matter how carefully it is planned out in the first instance.

The day books and journals having been closed and balanced against the rent roll, it is possible to arrive at the total charge against a consumer by cross-casting the amounts appearing in the various columns; the result being entered in the total column. From the information thus shown, the consumer's quarterly account is made out, and in course of time becomes due for payment. Before this time arrives, however, the figures are taken by the accountant for posting into the nominal ledgers of the undertaking. For convenience in working, the accounts of consumers with ordinary meters are, as previously mentioned, collected in order of wards. These wards are grouped into fourteen sections; the clerk in charge of each section being responsible for preparing a grand total of the accounts in his care for each column in the rent roll.

It is from these fourteen grand totals or summaries that the quantity of gas consumed at each rate is ascertained, and the average price realized per 1000 c.ft. sold worked out—thus providing valuable information for estimating profit and loss in future periods. By comparing the total consumption with the gas made, after due allowance for stocks, the quantity of gas unaccounted for is arrived at—a figure in which the distributing engineer is particularly interested.

A nominal ledger account is opened for each of the fourteen sections; and it is to these accounts that the totals of the money columns are debited. Taking the columns in the same order as they appear in the rent roll, the first money column is headed "Arrears," and is the balance of the rent that was charged to the ledger account the previous quarter. The second column, "Allowances," is at the present time out of use, owing to the method adopted in charging for gas. But it will be useful when the rebate on gas used for domestic purposes, consequent on the 10s. reduction in the price of household coal, comes into force.

At present, the first item to post into the ledger is the charge for gas consumed—that is, "Rent;" and this amount is debited to the account for the section or district concerned, and credited to "Gas Rental," from which items Nos. 1, 2, 3 on the credit side of the revenue account are extracted. In like manner the total of the fittings column is debited against the district and credited to the ledger account for fittings; the net result of this account being found in the first portion of item No. 10, "Fittings Sales," less charges. It will be remembered that the particular item of the fittings day book we had under review included in its total figure, not only the charges for the purchase and fixing of fittings, but also an amount from the distribution department for work carried out by them. It follows, therefore, that, having given the fittings account credit for the full amount, a further entry in the ledgers is necessary in order that this account should receive the total debit in respect of chargeable work. This is accomplished by charging to the fittings department the total of the order cost book (to which I referred earlier), and crediting it to the distribution account.

The remaining columns are, in turn, all posted against the district account and credited as follows: Burner maintenance to the account bearing this description, the balance of which is transferred annually to distribution, and forms part of item No. 7 on the debit side of the revenue account. Meter hire is quite a small charge in this area, and only applies to additional meters. The revenue, such as it is, helps to reduce the charge for the repairing of meters; while the amounts received for the hire of gas-fires and cookers are credited to a special hiring account, which, in turn, provides the information contained in the second portion of item No. 10 on the credit side, "Rental, less repairs and maintenance." Lamps on hire, as distinct from street lamps and lamps in courts and passages, forms part of, and is treated in just the same manner as, burner maintenance. The coke column is, of course, part of credit item No. 4, "Coke, less labour and cartage." Credits for cash received and discount allowed are posted into the rent rolls direct from the receipt book, in which a duplicate of each receipt issued is retained by means of carbon paper. At the close of each day, the receipt books for each district are totalled, and the amounts for cash and discount entered into the cash book concerned. Before any moneys are paid into the bank, the clerk in charge certifies, on the paying-in sheet from the entries contained in his cash book for the amount received through each receipt book—thus enabling the cashier to strike a balance between the cash received and cash paid into the bank.

As each quarter ends, an investigation is made of all old outstanding balances, and instructions are given to write-off certain items which are regarded as bad debts, and the difference between the amount shown in the total column and cash and discounts (if any) is carried to the "Arrears" column of the subsequent quarter. A grand total of the cash posted into the rent rolls is then prepared, which is balanced against the cash entered into the cash book; a similar procedure being also adopted with regard to discount allowed. Upon the receipt of these figures in the accountants department, each item is posted to the credit of the ledger account for its particular district, and the cash becomes a debit against the bank. Discount is charged to a separate ledger account named "Discount, Gas," the total of which appears in the revenue account, being deducted from the amount realized from the sale of gas. The ledger account for each district is balanced, and the total of the balancing figures, less cash held in suspense (such as deposits, &c.), forms the item appearing in the general balance-sheet, "Gas and Fittings Rental, balance due to the Corporation."

I have now roughly outlined the system of the Birmingham undertaking, as it stands to-day—a system which, during recent years, has undergone considerable change, with a view to cutting down unnecessary work in the preparation of new rent rolls, together with the copying forward into the journals from quarter to quarter of a large number of items, the greater proportion of which remain constant for a period of time.

Mr. W. BATT (Birmingham) proposed a vote of thanks to Mr. Timbrell for his interesting paper. The scheme outlined by the author, he said, might seem to an outsider a very complicated one; but he felt sure it would work quite smoothly. He asked what would happen if a fitter mislaid his ticket for any particular job.

Mr. B. J. BELL (Birmingham), in seconding the vote, said that the bookkeeper followed the fitter; and without the latter the former would be unnecessary. At the same time, when a job was done, it was necessary that an account should be presented, and further that the costs of the work should be got out and analyzed for comparison. Recent years had seen remarkable developments as regarded methods of bookkeeping and accountancy; and Mr. Timbrell had admirably shown in his paper how these had been effected.

Mr. E. COOKE (Accountant to the Birmingham Gas Department), called upon by the President to express his views, said he wished to emphasize the importance of the accountancy and business side of a gas undertaking. Much of a gas manager's time was taken up with business and office control; and as many of the members would be the gas managers of the future, this side of the undertaking should be brought before them at frequent intervals. In connection with the system that Mr. Timbrell had outlined, there were more than 120 clerks at work; and this did not include prepayment meters, which was a thorny subject.

Mr. SIMMONDS (Dudley) remarked on the manner in which a systematic record as to the cost of work done was of assistance to the district inspector. He had found the card system the best.

Mr. DAVIES (Smethwick) commented on the immense scope of the scheme outlined, and expressed a desire to see something of the details in operation.

Mr. POULSON (Stafford) said that often the business side of the training of a pupil in the gas industry was neglected, and this should not be the case.

Mr. RENDLE (Redditch) said he had much appreciated Mr. Cooke's remarks; and he felt that the administration side was of paramount importance to the juniors. By the scheme which Mr. Timbrell had placed before them, it would be easy to obtain the average price of gas charged to the consumer, and to decide quickly on future increases or decreases in price.

Mr. TIMBRELL, in reply, said he agreed with Mr. Bell that co-ordination of the technical and clerical sides was necessary for success in general working, as the bookkeeper was able to state whether a job was profitable or otherwise.

BYE-PRODUCT RESEARCH.

The present needs and future possibilities of the gas industry are discussed in the New York "Gas Age" by Mr. F. W. Sperr, Jun., the Chief Chemist of the Koppers Company, writing on "Bye-Product Research in the Industry." Referring to tar, ammonia, and light oil, he states that the bye-product coke-oven plants and gas-works of the United States sold $25,000,000 worth of these three bye-products in 1915, and $75,000,000 worth in 1918. Present values are difficult to estimate; but it is probable that, if normal conditions are soon attained, the sales will amount to about $50,000,000 per annum during the next two years. The income from the sales of tar, ammonia, and light oil is from 15 to 20 p.ct. of the gross revenue of the coal carbonizing works. Remarking that the vitality of an industry depends upon its ability to discard old equipment and methods and acquire new, he argues that, in relation to bye-product recovery, research may operate towards diminishing the cost of recovery, and increasing the quantity of production or the value of the products. Though research in the gas industry has accomplished much along the first two lines, the last has been greatly neglected. There is no other great bye-product industry that depends almost entirely upon outside interests to create uses for the materials from which it derives an important part of its income. A notable step towards the systematic prosecution of research for the benefit of the gas industry has been taken by the American Gas Association, in voting an appropriation for a research laboratory. The field for such research is enormous. Research from the standpoint of demand is just as important as research from the standpoint of production. Summing-up the present situation with respect to bye-product recovery in the gas industry, he says tar has little more than a crude fuel oil value, light oil has approximately a motor fuel value, and ammonia a fertilizer value. Developments have been such as to bring about large increases in the production of these bye-products. All research in the gas industry has been in this direction, with no corresponding efforts towards such increased utilization as would gain higher values. The situation demands extension of the scope of research; and the aim of new activities should be to make tar and light oil worth more than fuel, to encourage the increased use of ammonia and its compounds as fertilizers, &c., and to develop the recovery and the utilization of products that are now wasted.

Gas for Enamelling.

The Public Service Company of Northern Illinois state that during the past year there has been a large increase in the quantity of gas sold by them for fuel purposes in manufacturing operations. Fuel gas users include a large proportion of the biggest plants. Some of these plants, running at their normal capacity, require as much gas monthly as suffices for the entire needs of numerous towns ranking as important; but a point to be noted is that in practically every case the use of gas was begun on the smallest scale. One plant finds gas the ideal fuel required in thirty distinct processes. Among the latest industrial employments of gas is for enamelling, for which an oven of the muffle type is needed. In the case of solid fuel, the heat circulates in a space between the actual oven-wall and the outside casing. The heat developed by the gas is circulated on the sides of the muffle; but instead of being allowed to escape through a flue at the top (as is the case when other fuels are employed), it is directed at the ceiling of the oven in such a manner that heat is radiated back on to the articles being enamelled. The effect is a great increase in efficiency; while the physical changes in the oven enable also a large saving to be made in floor space. In the industrial districts round Chicago, several dozen enamelling ovens are in active operation; and such is the success achieved, that it is not doubted the rest of the ovens will ultimately be arranged for gas fuel. Enamelling constitutes a desirable gas load. The demand is continuous, Sundays and week-days, and the consumption is large.

At a meeting of the Midland Junior Gas Association on Thursday evening of this week, Mr. C. F. Tooby, Assistant Gas Engineer at Coventry, will read some short notes on the subject of "Gasification."

Before the Royal Society of Arts to-morrow [Wednesday] afternoon, at 4.30, a paper on "Industrial Training" will be read by Mr. James Currie, C.M.G., Controller of the Training Department of the Ministry of Labour.

"Good Times are Coming, if We Help them to," is the heading of a article contributed by Sir Robert Hadfield, Bart., D.Sc., D.Met., F.R.S., to the February issue of the "Bulletin" of the British Commercial Gas Association.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Income-Tax Allowance on Gas-Works Buildings, &c.

SIR,—Referring to the "Communicated Article" upon the above subject which appears in the issue of the "JOURNAL" for the 17th inst., will you allow me to state that the question as to what buildings are to be regarded as ancillary to, and forming part of, gas-works has engaged the attention of the Income-Tax Sub-Committee of this Association for some time past? A circular letter upon the matter will be sent to all members of the Association as soon as it has been approved by the Board of Inland Revenue.

5, *Victoria Street, S.W.*, *Feb.* 20, 1920. FRED E. COOPER, Secretary, Gas Companies' Protection Association.

National Association of Gas Officials.

SIR,—With regard to the letter of "Contented" in the issue of the "JOURNAL" for the 17th inst., may I suggest that he entirely misses the spirit of combination and association, when he says that, under his altered and happily improved conditions, he is undecided whether to join the Association of Technical Gas Officials.

I would point out to him that the prime object of such a combination would be, not merely to endeavour to obtain improved conditions of service and remuneration for oneself, but to assist other and less fortunate colleagues.

It is in this sense all gas officials should approach, and consider the subject. Not a single technical gas official should remain outside the Association, if it is to occupy the position of usefulness hoped for by its sponsors. It is the moral weight and support of the contented ones that are now most needed by those otherwise placed; and the measure of support accorded by joining the Association will be the criterion of the unity of the higher officials of British gas undertakings.

My present conditions of service and remuneration allow me to subscribe myself

Feb. 18, 1920. "CONTENTED (NO. 2) BUT HELPFUL."

Refractories for Coke-Ovens.

SIR,—At a recent meeting of the Midland Section of the Coke-Oven Managers' Association, on the above subject, I am reported as having stated: "But the content going to the ovens in the washed slack containing the adhering water as well as the salts inside the coal was about 2·0 p.ct. sodium chloride." This figure should be 0·2 p.ct. instead of the figure reported.

WM. GREEN.

Manvers Main Collieries, Wath-on-Dearne, Feb. 20, 1920.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

LOCAL AUTHORITIES ENABLING BILL.

The Local Authorities Enabling Bill, which was rejected on the motion for second reading last Friday, was to substitute a system of granting general powers, subject, in certain matters, to specific central regulation and control, to the larger local authorities for the present system of giving them specific powers for particular purposes.

Mr. FINNEY (Burslem), in moving the second reading of the Bill, said that if the measure became law it would not compel any local authority to use the powers which it would confer. The powers contained in the Bill could not be exercised without inquiry and sanction. The resources of the local authority would also be investigated; and the borrowing powers could not proceed beyond one-fourth of the rateable value of the area.

Mr. WILL THORNE, in seconding the motion, said the organized workers of the country had been for many years in favour of collective action, of extending the principles of local government, and even of giving more power to the Imperial Parliament. If the Bill became law, it would give the local authorities a great deal more power than they had at present. In past years local authorities had spent thousands and thousands of pounds in seeking to obtain powers by Act of Parliament or Provisional Order. This wasteful expenditure would be avoided by the Bill. If the local authorities had possessed the powers contained in the Bill, he believed it would have removed a great deal of the profiteering that was going on. For instance, the local authorities could supply coal. This would be useful in connection with gas-works, and would result in a much better distribution of coal than was possible under present arrangements. At present there was a terrible waste of money caused by the inhuman competition of private enterprise.

Mr. S. SAMUEL (Putney), who rose to move that the Bill be read that day six months, said that the proposal was one for nationalization; and he opposed it on the ground that it was likely to kill all individual enterprise. The manual workers were to elect representatives who were to have power to provide them with everything. The Labour Party overlooked the fact that these electors, or a great many of them, did not contribute anything to the rates. Therein lay one of the chief dangers of the Bill. If municipalities were to be allowed to carry on businesses of every description, there would be created such a condition of affairs that nobody outside the employment of the municipality would be able to exist in these centres. Under the borrowing powers clause, there was nothing to prevent an extremist body borrowing ten

times the rateable value. He did not anticipate that any profits would be made by municipal trading—cemeteries were the only undertakings of the kind that paid. But if there were profits, it was certain that the employees would say: "We must have our wages increased;" and the profits would disappear.

Major NEWMAN (Finchley), who seconded the rejection of the Bill, said he did not suppose that the House, as at present constituted, would ever accept such a measure. But there were now Labour majorities on 73 of the London Borough Councils; and should the Labour Party be returned to power, he was convinced that municipal trading would be one of the measures included in the Speech from the Throne. What he recommended the Labour Party to do was to select some place as a *corpus vile* for a trial of the experiment. If the thing proved a success there, the mass of the ratepayers of the country might allow the Labour Party to extend its operations. Municipal trading wanted very closely watching.

Mr. TREVELYAN THOMSON (Middlesbrough) said there were certain activities in which it would be advantageous that the municipalities should have extended powers; but it would be well to provide in the Bill that the services which might be established under it should not be a charge upon the community, nor should they be worked at a profit. Experience showed that municipal tramway, electrical, and water services had been carried on efficiently and to the public advantage in regard to prices. If local authorities liked to try experiments, let them do so; and in the event of the undertakings not succeeding, the ratepayers would quickly turn out of office those who were responsible for the failure.

Mr. N. M'LEAN (Govan) remarked that the granting of the powers proposed would in many ways curtail the powers of trusts, which were a grave public danger at present. The Bill was of even greater interest to the people now than it was when it was first introduced last May. Since then, trusts had grown up and prices had risen.

Mr. BRIDGEMAN (Parliamentary Secretary to the Board of Trade) said the proposers of the Bill had garbed it in such engaging innocence that few members had been able to discover the dangers which it contained. It was admitted that there were a great many dangers to be guarded against; but he could not say that there were any adequate safeguards in the Bill. In opposing the measure last year, he pointed out several obvious defects in it. One was that the machinery to exercise the safeguards was not the Board of Trade, but the Local Government Board. He pointed out, also, that the safeguards proposed in regard to borrowing were perfectly absurd, inasmuch as the municipal authorities had already borrowed beyond one-fourth of the rateable value of their districts. The real objection to the Bill was that it was a danger to the retail tradesmen in the municipal towns, who would be subjected to the unfair competition of rate-aided enterprises. Not a single municipal authority had petitioned in favour of the Bill. At present, the municipalities did not want it; and the question was a purely academic one.

On the House dividing, the numbers for the second reading were 26; against, 105—majority against, 79.

Bills Read a Second Time.

In the House of Lords, the following Bills were read a second time: Masham Urban District Council Bill, Newtownards Urban District Council Bill, Risca Urban District Council Bill.

In the House of Commons, the following Bills were read a second time: Blackpool Improvement Bill, Brighton and Hove Gas Bill, Coventry Corporation Bill, Halifax Corporation Bill, Pontypridd Urban District Council Bill, Redcar Urban District Council Bill, Rochester, Chatham, and Gillingham Gas Bill, Southend-on-Sea Gas Bill, Tredegar Urban District Council Bill.

Petitions against Private Bills.

Petitions have been presented against the following Bills:

Cardiff Corporation Bill, by the Cardiff Gas Light and Coke Company.

Merthyr Tydfil Corporation Bill, by the Dowlais Gas and Coke Company, and the Rhymney and Aber Valleys Gas and Water Company.

Nantyglo and Blaina and Brynmawr Electricity Board Bill, by the Brynmawr and Blaina Gas Company.

Port of London Authority (Consolidation) Bill, by the Gas Light and Coke Company.

South Metropolitan Gas Bill, by the Automobile Association and Motor Union and Others, London County Council, Corporation of London, Metropolitan Boroughs of Camberwell, Deptford, Woolwich, Bermondsey, Lewisham, Southwark, and Battersea, London and North-Western Railway Company, the West London Extension Railway Company, London and South-Western Railway Company, London, Brighton, and South Coast Railway Company, South Eastern Railway Company, London, Chatham and Dover Railway Company, and South Eastern and Chatham Railway Companies Managing Committee.

The South Suburban Gas Bill, by the Metropolitan Borough of Camberwell, London County Council, South Eastern Railway Company and others, Croydon Corporation, Erith Urban District Council, Bromley Corporation, Penge Urban District Council, Beckenham Urban District Council, Bexley Urban District Council, Chislehurst and Foots Cray Urban District Councils and Bromley and Dartford Rural District Councils, and Dartford Urban District Council.

Wandsworth, Wimbledon, and Epsom District Gas Bill, by the London County Council, and Owners, Lessees, or Occupiers of dwelling-houses within 300 yards of gas lands.

Public Utility Companies (Capital Issues) Bill.

Mr. BRIDGEMAN (the Parliamentary Secretary to the Board of Trade), in moving that the Bill—the text of which was given in the "JOURNAL" last week, p. 375—be read a second time, said that, as members generally were aware, gas and water companies (the only companies to which the Bill referred) were subjected to very close restriction in relation to their issues and the payment of dividends under the Special Acts that constituted them. For example, in some companies their permanent capital could not be raised at all under the Act; in others, the further issue of capital was limited to one-third of the total. During, and since, the war things which had occurred had led to a depreciation of the capital of these companies, and had made it almost impossible for them to get new capital subscribed under the conditions of their original Acts. The only way they could do this would be to come to the House in each case with a Private Bill. The Board of Trade had been in consultation with the authorities of the House who dealt with Private Bill Legislation; and they agreed with them that it would very much simplify procedure, and save the time of the House, if some general measure like the present were passed. It would also save the companies expense in the matter of Private Bill Legislation. He pointed out that what the Bill authorized the companies to do under various paragraphs of clause 1 was to issue other denominations of capital, and under paragraph (*e*) to pay a higher rate of dividend or interest than they could do under their original Act; and issue in excess of the total authorized capital only with the consent of the Board of Trade, and only after an Order had laid upon the table of the House for twenty-one days, during which a resolution against it could be presented by members. He hoped—subject, of course, to any small alteration of detail of the Bill, which could be done in Committee—the House would agree to the second reading.

Sir F. BANBURY said he thought, as a rule, the amount of debenture stock which parliamentary companies were allowed to issue was one-third of the capital, including the preference and ordinary stock.

Mr. BRIDGEMAN said that was so.

Sir F. BANBURY said he was always rather concerned when an attempt was made—and many attempts had been made during the last two years—to injure the property of debenture holders. Debenture stock was held by trustees and people of that description; and any attempt to depreciate the security ought to be very carefully watched. He did not quite gather whether the effect of paragraph (*d*) of subsection (1) of clause 1 was to increase the proportion of one-third to one-half, to make it one-half of the share capital. There was a definite clause in the Bill which read: "The expressions 'stock' and 'stockholder' include shares and shareholders." He did not know whether this meant that under the Bill debenture stock might be issued amounting to half the share capital or half the preference and share capital. What did it mean?

Mr. BRIDGEMAN said that the difference was only to change one-third to one-half of the debentures that could be raised in proportion to the total share capital, excluding debentures.

Sir F. BANBURY said the intention of the Bill was to increase the amount from one-third to one-half. This was a dangerous matter. Perhaps the point was a Committee point which could be dealt with later. Dealing with the schedule, which read: "2. If it is so provided in the resolution, the company may: (i) Call in and pay off the stock, or any part thereof, at any time before the date fixed for redemption; (ii) redeem the stock, or any part thereof," &c. He asked if this applied to what was about to be issued, or to the debenture stock already in existence. It should be made clear, because if it did apply to debentures or preference stock already in existence, he did not think this power ought to be given. The money had been lent on certain fixed terms. The only other point was as to whether it was advisable to increase the power to issue debentures. He did not think it was very advisable, even in the interests of the company. He thought some alteration in this would have to be made in the Committee stage; otherwise he had no objection to the Bill.

The Bill was read a second time, and committed to a Standing Committee.

Coal Shortage at Gas-Works.

Mr. MANVILLE asked the President of the Board of Trade whether he was aware that the stock of coal held at the Coventry Gas-Works was less than three days' requirements; whether this was due to the non-delivery by the railways of the quantities hitherto delivered and required by the gas-works; whether he was aware that the Coventry Gas-Works was only one of some 400 gas-works throughout the country which had less than one week's supply of coal; and also whether he would take immediate steps to ensure that the coal requirements of the Coventry and other gas-works throughout the country would receive the immediate attention of the Coal Controller and the Ministry of Transport, so as to prevent the failure of the gas supply, and the consequent closing of all factories dependent upon gas supply in these various towns.

Mr. BRIDGEMAN (the Parliamentary Secretary to the Board of Trade), who replied, said he was aware of the circumstances to which attention had been called; and every possible effort was being made, in conjunction with the Ministries of Transport and Shipping, to relieve the situation.

Summer Time.

Mr. FORREST asked the Prime Minister whether the Government had come to any decision with regard to the permanent adoption of "Summer Time;" and whether, before taking any step, he proposed to make inquiry into the working of the change.

Mr. SHORTT (the Secretary of State for the Home Department), who replied to the question, said that Summer Time was the subject of a very full inquiry by a Departmental Committee after its first introduction in 1916. No fresh considerations of importance had arisen since then; and he saw no occasion for further inquiry. As he stated in reply to a question on Aug. 4 last, the Government believed that the general feeling was strongly in favour of the continuance of the system, and it was their intention to propose legislation for the purpose of making it permanent.

Benzol Production and Prices.

Sir A. GEDDES, replying to a question by Captain MOREING, said that during 1918 approximately 32 million gallons of crude benzol were produced at coke-ovens in this country and 10 million gallons at gas-works. Statistics for 1919 were not yet available.

Sir H. BRITTAIN asked the Prime Minister whether he was aware that certain purchasers were offering prices for crude benzol 50 p.ct. in excess of the standard price fixed by the National Benzol Associa-

tion and that this benzol was refined and mixed with paraffin and inferior-grade petrol and sold as benzol—the genuine British industry being thereby adversely affected. Would he, therefore, take steps to legalize the intrepretation of the commercial use of the word benzol for use as motor spirit so that it was limited to fuel conforming to the standard specification of the National Benzol Association?

Mr. BRIDGEMAN, who replied on behalf of the Prime Minister, said he had seen reports to the effect that some purchasers had been offering higher prices for crude benzol than those arranged by the National Benzol Association. The question whether the use of the term "benzol" as a description of certain mixtures was a "false trade description" under the Merchandise Marks Act, 1887, was one for the Courts, and, as at present advised, he was not prepared to recommend legislation on the point.

LEGAL INTELLIGENCE.

ALLEGED NUISANCE FROM GAS-WORKS.

On Tuesday last Mr. Justice SARGANT gave judgment in the action of *Herring v. Mayor, &c., of Lincoln*, the trial of which had occupied eight days.

The plaintiff, Wm. Avory Herring, who carries on business as a nurseryman and florist at Bracebridge, claimed an injunction restraining the defendants from causing or permitting noxious matters from their gas-works to be discharged into the River Witham so as to cause a nuisance to plaintiff, and, in particular, to restrain them from polluting, through such discharge, the water in a ditch or branch of the river which adjoins plaintiff's premises and gardens, whereby the water was rendered poisonous and harmful to plaintiff's plants and produce.

In the course of his business, plaintiff grows large quantities of cucumbers, tomatoes, and geraniums; and he alleged that the water in the stream, which he had used for the past 27 years to water his plants, had become polluted owing to defendants, who own the gas-works, having (in July and August last) wrongfully caused or permitted to be discharged from the gas-works noxious matter destructive to plant life.

Defendants, while denying the allegation that noxious matters had been discharged from their works, in the alternative, said that if any polluting matter had been discharged from the gas-works into the river they had—by actual enjoyment by themselves and their predecessors in title, without interruption, for more than twenty years before the action was brought—acquired, by prescription, a right so to discharge the same. They further pleaded that, if any plants had been destroyed or damaged, it was not by reason of any pollution caused by act or default on their part. They were the undertakers for the supply of gas; and by their Act of 1847 special statutory penalties were provided for the party aggrieved in any such case as was alleged by the plaintiff to the exclusion of any other remedy.

His Lordship held that plaintiff had failed to prove that defendants had caused the damage complained of; and he had, therefore, no alternative but to dismiss the claim for damages, with costs. At the trial, defendants had abandoned their claim to pollute the stream; and this abandonment could be inserted in the order dismissing the action, but there had not been such pollution as would justify the granting of an injunction. From what had been said, he thought such improvements had been effected at the gas-works as would, in future, prevent deleterious matter going into the stream.

Seizure of Imported Gas-Mantles.

Sitting in the King's Bench Division on Wednesday last, the Lord Chief Justice heard a claim by the Crown for the forfeiture of sixty cases of gas-mantles seized by the London Customs Authorities on a Dutch ship. Mr. Giveen, who appeared for the Crown, explained that the defendants were a Dutch Corporation, styled the Gloelicht Industrie Ozon, who were the consignors of the mantles. The seizure was carried out under the Customs War Powers Act of 1915. The question was whether the defendants could satisfy the Court that the goods were not of enemy origin. The cases came to London in April, 1916; and it was suggested that they were due to Australia. Experts had said that the mantles were practically every part of them of enemy manufacture. After hearing technical evidence, the Lord Chief Justice said an article did not become less of a thing of enemy origin because a neutral firm improved it. In the result his Lordship endorsed the forfeiture of the goods. They were packed in Dutch cases and consigned in a Dutch ship; but the articles themselves, as suspected by the Customs, were of enemy origin. On that matter he had no doubt. He was not called upon to decide whether the mantles were assembled in Holland or the degree of skill and craftsmanship that led to their assembly, because practically the whole of the component parts came from Germany and were of enemy origin. His Lordship awarded costs to the Crown against the defendants.

Disputed Meter Registration at Devizes.

The Rector (Rev. A. H. T. Clarke) was respondent in a case brought recently before the Borough Justices by the Devizes Corporation to recover £3 6s. 8d. for gas supplied to the parish room for the quarter to September last. The meter showed a consumption of 14,100 c.ft., and this being unusually large, it was agreed that the meter should be tested—the Rector to pay the expenses if it proved to be correct, and the Gas Committee if the meter was wrong. When tested, it was found absolutely correct. The Rector denied that he agreed to this; but a letter was read to show that his agent did. The Rector wrote to the Gas Manager (Mr. W. J. Rendell Baker) saying he could not understand why the parish room gas bill had risen from a minimum of 2s. 8d. and a maximum of 7s. 6d. to £3 6s. 8d., when he could show that the room had not been any more frequently used. Officials from Bath proved the testing of the meter. The Rector said he did not wish to avoid payment of what was proper; but he regarded this as a test case. He was responsible for this public money; and he could not allow it to be spent unless it was fairly explained to the public. Mr. W. H. Taylor (for the Corporation) said that the Rector should not have agreed to the test and then disputed it. The Chairman said the Justices had carefully considered the case; and they did not wonder that the Rector thought there was something wrong, seeing that there was such a large increase in the consumption of gas in the summer quarter. At the same time, in the absence of any evidence that a mistake was made in the mater reading, the register of the meter had been proved accurate, and must be taken. Therefore the amount due must be paid. In all the circumstances, the Bench were not disposed to allow any costs. The facts of the case showed how desirable it was that everybody should learn to read his own meter, and to find out if there was any leakage. Mr. Taylor appealed to the Bench to allow the expenses of the inspector from Bath; and £2 2s. were awarded for this purpose.

REGISTER OF PATENTS.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Feb. 18.]

Nos. 3841—4600.

BAILY, A.—"Gas fire-lighter for coal-fires." No. 4330.
BEILBY, Sir G. T.—"Motor-fuel." No. 4562.
BLAKELEY, W.—"Gas-purifiers." No. 3860.
BOURDON, C.—"Gas-purifying apparatus." No. 4232.
CLARK, R. W.—"Gas-fittings for illuminating." No. 4587.
DOWSON & MASON GAS PLANT COMPANY.—"Gas-fired furnaces." No. 4573.
DRAKE, J. W., and DRAKES Ltd.—"Vertical retort-settings." No. 3863.
ELECTRICAL CONTRACTING COMPANY.—"Electrical device for gas, &c., protection."—No. 4426.
ENDECOTT, F. C.—"Automatic attachment for turning off gas-taps, &c." No. 4521.
ENGLAND, R. D.—See Electrical Contracting Company, No. 4426.
FAIRWEATHER, J. H.—"Gas-calorimeters." No. 4228,
FIRTH BLAKELEY, SONS, & Co.—See Blakeley. No. 3860.
HARTLEY, H.—"Gas-burners." No. 4413.
IMPERIAL TRUST FOR THE ENCOURAGEMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.—"Clay, &c." No. 4475.
IMPERIAL TRUST FOR THE ENCOURAGEMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.—"Moderants in use of clays, preparation of china, &c." No. 4476.
INSTITUTION OF GAS ENGINEERS.—See Imperial Trust, No. 4475.
KING, R. O.—"Flow-meters." No. 4057.
KITCHEN, J. G. A.—"Burners." No. 4034.
KNIGHT, P. E.—"Inverted incandescent gas-burners." No. 3931.
KNOWLES, G. E.—"Manufacture of tar derivative tanning materials." No. 4155.
KOPPERS COMPANY.—"Purification of liquors containing phenoloid bodies." No. 4595.
M'ARTHUR & Co., H. M.—See Knowles. No. 4155.
MAINA, J.—"Gas-stoves." No. 4348.
MELAMID, M.—"Process for manufacture of transformer oil from tar oils." No. 4591.
MELDAL, E.—"Lighting methods for rooms, buildings, &c."—No. 4384.
MELLOR, J. W.—See Imperial Trust. Nos. 4475, 4476.
MOORE, B.—See Imperial Trust. No. 4476.
MOSS, H.—See King. No. 4057.
PATON, J.—"Gas-fired furnaces." No. 4573.
RICHARDS, G.—"Means for locking taps." No. 4550.
RICHMOND GAS STOVE AND METER COMPANY.—See Hartley. No. 4413.
SLACK, J. E.—"Pipe connections for fluid under pressure. No. 4500.
TAMPIER, R. J. C.—"Cocks." No. 4386.
THERMAL SYNDICATE.—See Clark. No. 4587.
THORP, F. & H. T.—"Head or nozzle for burning explosive mixture of gas and air." No. 4410.
WILLIAMS, C. R. F.—"Device for cleaning liquid-fuel atmospheric burners." No. 4245.
WINTERFLOOD, B. W.—"Water-heaters." No. 3924.
WINTERFLOOD, B. W.—"Gas tap or cock."—No. 3925.

Gas Testing at Wandsworth.—The General Purposes Committee of the Wandsworth Borough Council report that they have given further consideration to the question of the arrangements for testing the gas supplied by the Wandsworth, Wimbledon, and Epsom District Gas Company. Prior to March, 1916, the Council's Gas Examiner was required to make one test each week at the Council's testing-station at Putney, and one test each week at the testing-station at Haydon's Road, Wimbledon, in respect of illuminating power, calorific value, &c., and twelve additional tests per annum of the calorific power at each station at irregular times. In consequence of representations made by the Ministry of Munitions as to steps to be taken to prevent complaints of deterioration of the gas in consequence of the extraction therefrom of benzol and toluol for manufacturing explosives, the Council decided to terminate the arrangement for the period of the war, and to have only one-half the number of tests. Having regard to the altered conditions, the Committee have come to the conclusion that the time has now arrived when the arrangements in operation prior to March, 1916, should be reverted to.

MISCELLANEOUS NEWS.

LONDON COUNTY COUNCIL AND THE METROPOLITAN GAS BILLS.

Important Objections—Mainly on Financial Clauses.

A report of considerable importance is to be made by the Public Control Committee at the meeting of the London County Council to-day, on the subject of the proposals contained in the South Metropolitan and the South Suburban Gas Companies' Bills, together with some comments upon the Bill of the Wandsworth, Wimbledon, and Epsom District Gas Company. In view of its importance, we give this report *in extenso*. It will be noticed that it is principally on the financial revision clauses of the two first-named Bills that the Committee raise strong objection. They are averse to legislation on these matters proceeding piecemeal when the Government are proposing to introduce general legislation. The report is as follows.

The Council, on Feb. 10, 1920, decided to oppose, and to present petitions against, the South Metropolitan Gas Bill, the South Suburban Gas Bill, and the Wandsworth, Wimbledon, and Epsom District Gas Bill, which have been introduced into Parliament in the session of 1920. The questions arising come within our purview; and it accordingly devolves upon us to advise the Council as to the action to be taken relative to the important questions of principle involved.

BASIS OF CHARGE FOR GAS.

We reported fully on Dec. 2, 1919, as to the recommendation of the Fuel Research Board to the Board of Trade, and upon the proposal therein made that gas should be charged according to the potential heat units supplied to consumers, instead of by volume as at present. The Council on that date expressed its general approval of the recommendations in the report in question. The first two Bills referred to seek to give statutory effect to the recommendation to charge on a heat basis and, further, to amend the sliding-scale provisions applicable to each company. The companies' proposals, however, seem to be somewhat premature, inasmuch as the Board of Trade has signified its intention of introducing a Bill to give effect to the recommendations of the Fuel Research Board. Such Government Bill must necessarily provide for a revision of the existing sliding-scale regulating price and dividend in order to meet the changed conditions of charge. It is understood also that the Board of Trade has, at the instance of the gas industry, promised to consider the question of a revision which will give an added benefit to the shareholders. The introduction, therefore, at the present time, by two companies only, of Bills dealing with matters which will be incorporated in the Government measure is extremely undesirable. Further, the dissimilarity of the separate proposals tends to complicate the position. We are, therefore, of opinion that any attempt to deal piecemeal with a weighty problem which demands treatment upon comprehensive and general lines is strongly to be deprecated. The report of the Fuel Research Board has been aptly described as giving a new charter to gas companies, but the proposals in the report entail such fundamental alterations of the existing gas statutes that they should be expressed in unequivocal terms. Six companies supply gas to the County of London, and 14 more in the remainder of Greater London. In the rest of the country, there are no less than 96 companies whose undertakings are of considerable importance. It is clearly undesirable that these companies should go separately to Parliament, each placing its own interpretation on the conclusions of the Fuel Research Board. To do so would give rise to an appalling degree of inconsistency, to the detriment of the consumer and the confusion of local authorities possessing powers of control over gas companies.

In giving effect to the suggestion to charge consumers of gas upon a heat basis, it is proposed that the number of thermal units chargeable shall be calculated by multiplying the number of cubic feet of gas registered by the declared gross calorific value of the gas per cubic foot. It is obviously necessary, however, to provide some safeguard against the consumer being charged for the supply of gas of a quality inferior to that declared. The two Bills above mentioned make the companies liable to certain penalties if the gas should fall below a definite calorific value. The amount of these penalties, however, is small, and in no way benefits the consumer, as they are paid into the Police Fund. A clause should therefore be inserted in both Bills enabling a consumer to benefit by a reduction of price fully equal to the amount by which the gas actually falls short of its declared value.

ALTERATION OF SLIDING-SCALE.

The most important feature of the Bills is the proposed alteration of the sliding-scale in favour of the companies. In the case of the South Metropolitan Gas Company, the sliding-scale, as at present understood in its application to gas companies, is to be entirely abolished. Instead of this scale, the surplus profits arising after charging for gas at a nominal price of 11d. per heat unit, and after providing a minimum dividend of 6 p.ct. on the nominal amount of the ordinary stock, are to be divided in fixed proportions between the consumers, shareholders, and employees. The price charged for gas may be raised to such amount as may be necessary to produce the minimum dividend on the ordinary stock; and thus the entire burden of increased cost or extravagance in management will fall on the consumer, even when such increased cost is caused by inefficiency or extravagance or mismanagement.

The sliding-scale was instituted to provide an incentive to economical management by giving the companies an additional dividend if costs could be reduced, and conversely penalizing the companies if costs were increased. The company is seeking to remove the penalty while retaining the advantage.

It should be borne in mind that the present amount of ordinary stock issued by the South Metropolitan Gas Company (£6,609,895) includes a considerable amount (£3,285,000) nominally added on conversion of capital into stocks carrying a lower nominal rate of interest. The company is, in effect, asking to be allowed to pay on the converted capital a minimum dividend which gives an average of 15 p.ct.—in fact, on a large portion thereof the actual rate will be nearly 18 p.ct. On the total ordinary capital (including premiums) now invested in the undertaking, the company is practically seeking powers to enable it to pay a minimum dividend equal to 10 p.ct. Not only does the company ask for a large improvement in the present dividend, but it seeks to secure that any movement in the direction of pre-war prices of gas shall benefit the company greatly. To increase the nominal rate of dividend to 6 p.ct. from the present temporarily authorized rate of 3 p.ct. will require a sum of £198,297, and involve an addition to the present high rate charged for gas approximately equivalent to 3¾d. per 1000 c.ft.

The Bill will, incidentally, give the company other advantages. Under the existing sliding-scale conditions, the ratio in which savings arising from any reduction in cost of manufacture are divided between consumers and shareholders varies according to whether the sales of gas increase at a greater rate than the ordinary capital. Under the Bill, the proportion will remain constant in the ratio of 6 to 1, irrespective of variations in the ratio of capital to sales of gas. The effect of the company's proposals is to secure to the shareholders a slightly larger proportion of savings than has obtained in recent years.

The proposal of the South Suburban Gas Company to alter the basis of charge is, as in the previous case, accompanied by an alteration of the sliding-scale. To appreciate fully the effect of this alteration, it is necessary to consider the result if gas of similar quality to that prescribed when the existing sliding-scale conditions were fixed is continued to be sold. The present standard rate of dividend of 5 p.ct. is to be altered to 6 p.ct., and the standard price is to be 1s. 2d. per calorific unit, instead of 2s. 9d. per 1000 c.ft. as at present. Provision is made for an increase (or decrease) in dividend, by 3s. 4d. p.ct. for every ⅜d. by which the selling price is less (or greater) than the standard price. Under the company's Act of 1912, gas supplied is to be of a prescribed calorific value of 540 B.Th.U.; the company being liable to penalties if the quality of gas falls below 475 B.Th.U. The standard calorific power is altered by the Bill to 450 B.Th.U., which also becomes the penalty standard. The Bill provides that no dividend in excess of 6 p.ct. shall be paid on the ordinary stock before June 30, 1926.

The Bill has a two-fold effect on the sliding-scale—first, by reason of the alteration in the standard price; secondly, by reason of the reduction in the quality of gas supplied.

The present price charged by the South Suburban Gas Company for gas is 5s. 2d. per 1000 c.ft. The effect of the alteration proposed will be to restore to the company practically its pre-war rate of dividend, notwithstanding that the price charged is more than double the pre-war price. For example, the prices charged for gas in 1914 were 2s. 3d. and 2s. 5d. per 1000 c.ft. in the inner area, which enabled the company to distribute an average dividend of £5 16s. 8d. p.ct.—*i.e.*, on the capital as converted. Under the proposals in the Bill, gas supplied at a price equivalent to 5s. 2d. per 1000 c.ft., if of pre-war quality, would entitle the company to distribute £7 10s. p.ct., and if of the new standard (450 B.Th.U.), would enable the company to distribute £6 3s. 4d. p.ct. The main effect of the Bill is, therefore, to increase the relative standard price. To obtain the same heating result the consumer will require to use more of the lower quality gas. The disadvantage which the consumer has had to bear in this respect by reason of the restrictions caused by the war will be perpetuated; and by the virtual raising of the standard price the company gains by the lowering in the quality of the gas. The proportion in which savings or increases in cost of manufacture are shared between the shareholders and consumers respectively is not materially altered by the proposals in the Bill.

In view of the foregoing considerations, we are strongly of opinion that the proposals of the companies as regards the suggested alteration of the sliding-scale should be resisted by the Council.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS BILL.

This Bill seeks to enable the company to raise additional capital by the creation and issue of preference stock not exceeding £500,000, and to borrow or raise money, by the creation and issue of debentures, to the extent of one-third of this amount. The present unissued capital powers of the company amount to £488,926, which, when combined with the powers asked for in the present Bill, gives the company a total unused power of £1,155,592. The powers available under the Bill represent an increase of more than 100 p.ct. on the present capital employed. It would seem that the company is not in immediate need of an increase of capital powers; and the Bill, if passed in its present form, would enable the company to avoid going to Parliament for a considerable number of years. We are accordingly of opinion that the company should be required to reduce substantially the capital powers sought by the Bill.

PROFIT SHARING AND CO-PARTNERSHIP.

The South Metropolitan Gas Bill contains proposals for giving an added interest to the employees. The benefit accrues at the stage when the dividend exceeds the standard rate, and the disposal of the surplus will be on the basis of a uniform percentage of bonus on the salaries and wages of the co-partnership employees of the company. The Wandsworth, Wimbledon, and Epsom District Gas Bill also contains clauses dealing with the issue and disposal of stock under the company's profit-sharing scheme. These proposals do not call for comment.

GAS TESTING.

The Council's gas-testing powers are confined to the areas of the three Metropolitan Gas Companies. Considerable portions of the county are supplied by the Wandsworth, Wimbledon, and Epsom District Gas Company, the South Suburban Gas Company, and the Brentford Gas Company. In these areas the testing is carried out under the direction of the local authorities as follows: Wandsworth, Wimbledon, and Epsom District Gas Company, five tests a fortnight by the Wandsworth Metropolitan Borough Council. South Suburban Gas Company, four tests a year by the Lewisham Metropolitan Borough Council. Brentford Gas Company, average of forty tests a year by the Chiswick Urban District Council. These arrangements

are not, of course, comparable with those operating in the County of London, where the gas is tested daily by the Council's Gas Examiners at testing-stations, and with apparatus and by methods prescribed by the Metropolitan Gas Referees.

We are of opinion that advantage should be taken of any application to Parliament by the South Suburban, the Wandsworth, Wimbledon, and Epsom District Gas, and the Brentford Gas Companies to secure that the testing of their gas should be made subject to control similar to that obtaining in the case of the three Metropolitan Gas Companies. We recommend:

(*a*) That in the opinion of the Council—

(i) The proposals of the South Metropolitan Gas Company and the South Suburban Gas Company to give statutory effect to the recommendations of the Fuel Research Board as to the alteration of the basis of charge for gas are inopportune, having regard to the promised introduction of a Government Bill dealing with the whole question.

(ii) The proposals to alter the existing sliding-scale in the manner proposed in the South Metropolitan and South Suburban Gas Bills, 1920, are inimical to the interests of consumers.

(iii) In the event of the South Metropolitan and South Suburban Gas Bills, 1920, being allow to proceed, the Bills should be amended so as to provide:

(1) For a considerable modification of the clauses dealing with the amendment of the existing sliding-scales regulating price and dividend.

(2) That, should a company supply gas which, for any period, falls below its declared calorific value, the consumer shall benefit by a reduction in price fully equal to the amount by which the gas actually falls short of such declared value.

(*b*) That, in the opinion of the Council, the proposals embodied in the Wandsworth, Wimbledon, and Epsom District Gas Bill, 1920, for raising additional capital, require to be modified substantially.

(*c*) That, in the opinion of the Council, the South Suburban and Wandsworth, Wimbledon, and Epsom District Gas Companies should be subject to control in regard to gas testing similar to that now obtaining in the case of the three Metropolitan Gas Companies.

SOUTH SUBURBAN GAS COMPANY.

The Annual Ordinary Meeting of the Company was held last Friday, at the Cannon Street Hotel, E.C.—Mr. CHARLES HUNT in the chair.

The SECRETARY (Mr. Wilfrid Wastell) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

NO CESSATION OF TROUBLES, BUT STILL CONFIDENCE.

The CHAIRMAN, in moving the adoption of the report and accounts, said: Ladies and gentlemen, It will hardly be a surprise to you to hear that the year which has elapsed since we last met you brought with it no cessation of the troubles which some of us, perhaps rather sanguinely, believed to be purely wartime products. In fact, in some respects the position was worse than it had been during any period of the war; but I am glad to be able to add that, so far as it has been in the power of the Board to control this, the account we have to place before you is one for which we can with complete confidence ask your approval.

VALUE OF WORKS COMMITTEES.

In the first place let me remind you that mention was made last year of the formation of a Works Committee, composed of the workmen members of the Co-partnership Committee, and charged with the duty of taking cognizance of any complaints or grievances among the workmen, and making suggestions and reporting thereon, together with any matter relating to the conditions of employment. I am very glad to say that this Committee has, so far, been a complete success. It has shown throughout an earnest desire to give to every matter brought to its notice full and impartial consideration, with the result that, of the numerous cases to which its attention has been directed, not a single one has had to be referred either to the Co-partnership Committee as a whole, or to myself as final Arbitrator. Full and copious notes of the proceedings of this Committee have been kept by its Secretary ever since its formation; and every line of these bears evidence of a conscientious desire to give every matter, however trivial, the most exhaustive and impartial consideration. They show, also, upon every needful occasion, a resourcefulness and tact that are worthy of the highest praise. Without in the least desiring to depreciate the good work of which what are known as the Whitley Committees are capable of, and indeed are doing, we feel that we have "gone one better," by invoking the full co-partnership spirit which the Whitley scheme unfortunately ignores. Judging from present experience, it is difficult to imagine any system better calculated to ensure complete harmony of working.

SUPERANNUATION SCHEME FOR ALL EMPLOYEES.

On what has come to be known as the "welfare" side, the Directors have taken a step of which they feel with confidence the proprietors will fully approve. This is the formation of a superannuation scheme, embracing the whole of the Company's employees on the principle of equal contribution, equal benefit. Until now the full advantage of superannuation has been enjoyed only by the staff, contribution to what was known as the Officers' Superannuation Fund having been a condition of their service; while the only provision for the workmen was a fund which, for a voluntary contribution of 3d. per week, secured a wholly inadequate provision for old age. This provision was, in fact, described in the Book of Rules as "a minimum pension, in order to save workmen from the necessity of applying for parish relief in the event of incapacity or old age." We had felt for a long time that effect should be given to a broader view than is implied by this extract, which dates, I believe, as far back as the year 1880; but the chief difficulty in the way appeared to be the amount which the workmen would be prepared to subscribe to a contributory scheme on lines similar to those of the Officers' Superannuation Fund. I am very pleased to say that, on consulting with the Works Committee, this difficulty was found to be practically without foundation; and with the active assistance and co-operation of all concerned, a thoroughly comprehensive plan was prepared, by which the two existing funds are merged into one Co-partners' Superannuation Scheme, which now embraces every co-partner in the service of the Company. It provides also for widows at the option of members. Copies of the rules of this new scheme, which came into operation on Jan. 1 last, are here for the inspection of the proprietors.

THE SHORTAGE OF COAL.

Turning now to another, and a less agreeable matter, over which the Directors have had absolutely no control, it is, of course, common knowledge that there has been for some considerable time a shortage of coal, though why this should be the case to a greater extent than it was at any period throughout the war, when so many of the miners were serving with the colours, and when every factory in the land was busy night and day turning out munitions, no one seems able to explain satisfactorily. At one time, a good deal was said about this shortage being due to the reduction of the miners' working hours, and probably this is still largely answerable for it; but much more has recently been heard of bad working of the railways, resulting in pits being held up for want of wagons, and also of large quantities of rolling stock alleged to be out of repair. But, whatever be the cause, the result is little short of disastrous, especially to an industry like our own, to which coal means everything. It has always been our aim to hold good stocks of coal; but in spite of all endeavours, the Company's stock became reduced at the end of last year to but little more than one week's consumption, which, with half of the winter—and often the most inclement half—to look forward to, was wholly insufficient. At the same time, our contracts, notwithstanding every effort to secure delivery of them, were 26,000 tons in arrear—a quantity which, I need hardly say, would, if obtainable, have removed all cause for anxiety. In this extremity—for such it really was—our good friends and neighbours, the South Metropolitan Gas Company, very kindly placed a cargo of their coal at our disposal, and, with the supplies received since then from other sources, and with the assistance also (it must in justice be said) of the Coal Controller, the tension has for the time being been relieved. But what assurance is there for the future, if contracts are not to be respected, even though entered into in accordance with what was understood to be the wish of the Coal Controller, whose numerous assistants throughout the country have full power to commandeer coal, and distribute it where needed? To what extent this may be answerable for our own shortage should rest between the Coal Controller and our contractors, from one or the other of whom the Company would appear to be entitled to compensation for the cost incurred in procuring coal elsewhere, to say nothing of the serious danger of the gas supply being interrupted. I may also say that three contracts were wholly taken from the Company by the Coal Controller, after directing us to draw supplies by sea from the Durham coal-field. In vain we urged that it would be much cheaper to send more Durham coal to the Midlands by rail to replace any shortage there, and even to take it all the way to London by rail, as we were then doing, than to London by sea, having regard to the present high charges for freightage and landing. It is understood that this is actually what has since had to be done in increasing quantities.

THE BELVEDERE SITE AND SEABORNE COAL.

It was with the ultimate object of securing access to the river, and so to the Durham coal-field by sea, that the Company's amalgamations of 1912 were undertaken, and it was in furtherance of that object that the land at Belvedere was acquired two years later. But we never even dreamed of using the sea route, still less of being called upon to use it, before a single brick is laid at Belvedere, and while the cost of freightage is so high as to be almost prohibitive. It justifies our prescience, however, in getting to the river; and, judging from recent figures which have been published as to the actual cost of freightage as compared with its controlled price—showing a profit of nearly 50 p.ct.—the sooner we establish ourselves at Belvedere, the better will it be for our consumers, the Company, and all concerned.

GAS SALES AND THE DEMAND FOR APPLIANCES.

The smallness of the reduction—1·3 p.ct.—in the gas sales for the year indicates that the great falling-off in the requirements for munitions and other purposes connected with the war has already been almost made up by increased consumption in other directions. There has, in fact, been an improvement in the consumption for domestic purposes and public lighting taken together of 9·38 p.ct., which, even allowing for the effect of the Gas Rationing Order in force in the previous year, cannot but be regarded as satisfactory. That Order was, as you are aware, revoked last autumn; and perhaps the less said about it the better, because, after all, it really seems to have proved a blessing in disguise. At any rate, the reaction which followed its revocation was, and continues to be, very marked; the demand for gas heating appliances being greater than ever, and, for the time being, practically impossible to keep pace with. The percentage of these now on hire continues to be the highest on record, although there has not yet been time to fully exploit the newly acquired Dartford district. I may perhaps refer in this connection to the somewhat high percentage of unaccounted-for gas as shown in the statement of accounts. This is of recent growth, and has been a matter of anxiety to the Directors. To it, among other matters, the attention of our new Engineer (Mr. John Terrace) has been specially directed; and there is reason to hope that he is on the right track as to its cause, and that before very long an improvement may be apparent with regard to it.

FEATURES OF THE ACCOUNTS.

The accounts include for the first time those of the Dartford undertaking, which was acquired in 1918, and the final appearance will also be noted of the small amount of 5 p.ct. preference stock which has been converted into 5 p.ct. debenture stock to clear the way for a further issue of preference stock should this become necessary; also of the West Kent ordinary stock, re-appearing as ordinary stock—both conversions being in accordance with the Company's Act of 1918. But

the arresting features of the accounts are undoubtedly the exceedingly high figures which appear on both sides of the revenue account. Thus the expenditure now stands at a total of £772,066, which is £121,304 —or about 18·5 p ct.—more than that of the previous year; the total income being £828,385, or £98,464 more than that of the previous year, including Dartford. This shows the gross profit to be £56,319, which is less than that of the previous year by £22,845; thus accounting for the necessity of having to draw upon the undivided profit in order to pay the very modest dividend allowed by the Statutory Undertakings (Temporary Increase of Charges) Act, 1918, of 3¾ p.ct., less tax. Meagre as is this return, especially having regard to the value of money at the present time and to the high rate of interest which the Government itself has now to pay for loans, the Act which authorizes it has saved us from something very much worse, since, under our sliding-scale, we should only have been entitled, at the present price of gas, to a dividend of 3s. 4d., or one-sixth of 1 p.ct. per annum. As compared with the pre-war year of 1913, the total expenditure (including Dartford) per 1000 c.ft. sold has nearly doubled, while the total profit earned is less by about 29 p.ct.

THE UPWARD TENDENCY OF WORKING COSTS—THE DOMESTIC GAS ALLOWANCE.

Large, however, as is the 1919 expenditure, that for the present year is certain to exceed it; both wages and railway rates having been recently advanced, while there is to be provided for a possible increase in the proportion of coal coming by sea from Durham. This continued upward tendency of working costs is, I need hardly say, very disconcerting, and beclouds with its uncertainty the otherwise bright prospects of improving business. There is everywhere an increasing demand for gas, particularly for heating purposes, and we should be exceedingly sorry to be obliged to do anything to check this; while, on the other hand, nothing would give us greater pleasure than to be able to encourage it by reducing the price of gas, or by affording further facilities for its extended use. However, we shall at all events have the gratification shortly of returning to consumers the amount which they, or about 87 p.ct. of them, will be entitled, as users of gas for domestic purposes, to receive under the order as to the 10s. drop in the price of coal. This is estimated at 7½d. per 1000 c.ft.

THE CAPITAL ISSUES BILL.

There has just been issued the print of a Bill introduced by the Board of Trade, entitled the "Public Utility Companies (Capital Issues) Bill," the object of which is to give to all statutory gas and water companies the same facilities for the raising of capital by preference or debenture stock, which have been given during recent years to many such companies by Parliament. It also authorizes the sale of stock at a reserve price lower than the nominal amount of the stock, and extends borrowing powers to one-half in place of one-third of the share capital for the time being issued and paid up. This is all to the good, so far as it goes; but it offers no relief to the present holders of ordinary stock. We may, however, welcome it as the first instalment of the financial relief which was promised by the Board of Trade last autumn, and the second and most important instalment of which it is greatly to be hoped will not be much longer delayed.

CO-PARTNERSHIP AND THE WAR MEMORIAL.

I shall presently have an opportunity of saying a few words with regard to our Bill; and therefore the only other matter that need be mentioned now is that Lord Robert Cecil, K.C., M.P., whose consistent advocacy of co-partnership is well known, has done us the honour of consenting to perform the ceremony of unveiling our War Memorial. The meeting for this purpose will give an opportunity for welcoming the Company's co-partners who were engaged in the war, and have now returned to their employment. A full and final statement will, at the same time, be given of the activities of the war fund, which is now closed. Should any proprietors, ladies or gentlemen, desire to be present on this very interesting occasion, which is expected to take place some time in April, and will kindly give intimation at once to the Secretary, arrangements will be made accordingly, and invitations sent in due course.

CO-PARTNERSHIP, COAL, AND LEGISLATION.

The DEPUTY-CHAIRMAN (Sir Fortescue Flannery, Bart., M.P.) said with great pleasure and confidence he seconded the motion. The Chairman had, as usual, so completely hit the nails upon their heads, that there was very little left for anyone else following him to say upon the affairs of the Company. He should like, however, to reinforce what had been said about the co-partnership spirit which permeated all connected with the Company, both the ordinary stockholders and the employee co-partners. The spirit grew in intensity and enthusiasm; and he believed that from one end of the undertaking to the other there was an increasing conviction in the minds of the employees that the co-partnership system was just and fair to them as to everyone else concerned. He was sorry that in the King's Speech there was no indication that the Government were learning the lesson that the gas companies had been teaching the last twenty and more years. There was no doubt in his own mind that the true solution of the labour difficulty throughout the country was in the system of co-partnership. When Sir George Livesey laid the foundation of co-partnership in one gas company, he little thought how far and how wide would be the result of the change and improvement that he had made. He (Sir Fortescue) for one looked forward with great confidence to the whole of the employment system of the country following in the wake of the gas industry. On the question of the scarcity of coal, which had been a matter of daily anxiety to the management, he believed that every day improvement would occur in the transport arrangements. The whole of the transport arrangements as regarded goods had been completely demoralized as the result of the war. Short of wagons, short of locomotives—not so much that they had been lost, but because they had been injured by the rough usage of the war; and there had not been time and opportunity to put them into repair again. This lack of haulage and wagon facilities was being rapidly overtaken; and he was inclined to think that if the colliers would give the supply at the pit's mouth, transport difficulties would disappear, so that, by the next general meeting, they might not have the same complaint to make—a complaint which was of the utmost importance and represented the utmost difficulty. As to the figures which indicated in the way of gas consumption the transfer from war to peace conditions. The proprietors were aware that on one section of their system they had during the war the duty of supplying large quantities of gas for munition making. This had been necessarily all stopped; and when they allowed for the shrinkage of consumption due to the stoppage on the one hand, and the increasing consumption due to resuming peace conditions on the other, they would appreciate the almost complete reinstatement there had been of consumption. This was a very encouraging sign indeed; and it showed that the Company were moving from war to peace conditions quickly. The Chairman had referred to a very serious matter—perhaps the most serious of all the matters he had alluded to so far as the individual pockets of the proprietors were concerned. He had mentioned one Bill the Government had introduced, and the other Bill that it was hoped they would introduce for the relief of gas share and stock holders. He did not mean relief *ad misericordiam*; or relief for the giving of more capital for increased plant, and to resume the full usefulness of the industry. The Bill that had been introduced did enable capital to be raised under preferential conditions; but it did nothing to place capital already in existence in a pre-war state as an investment. Unless this was done, the industry could not expect to prosper; and it could not be as useful to the community at large as it otherwise would be. Some of them in Parliament were intending to press this matter not only in the interests of gas shareholders, but in the interests of industry at large, and because it was a matter of urgent necessity.

The motion was unanimously carried

THE DIVIDEND.

Moved by the CHAIRMAN, and seconded by Mr. E. P. NORTON, a dividend was declared at the rate per annum of 3¾ p.ct. on the ordinary stock, less income-tax.

RE-ELECTIONS.

The CHAIRMAN moved the re-election as Directors of Sir J. Fortescue Flannery, Bart., M.P., Sir John Boraston, and Mr. Alexander Dickson. He remarked that Sir Fortescue Flannery was the Senior Director of the Board. He was the sole remaining Director as it was constituted in 1902, when he (the Chairman) joined it. Therefore there was no one in a better position than he (the Chairman) to say what great service Sir Fortescue had rendered to the Company during this long period. He was also the main representative of the industry in Parliament. Therefore a great deal fell upon his shoulders. If they did not get substantial relief, it would not be the fault of Sir Fortescue. As to Sir John Boraston, the longer they knew him, the better they liked him. His unique knowledge of men and things they would miss extremely should anything occur to sever his connection with the Board. He took the opportunity of congratulating Sir John upon the distinguished services of his son Lieut.-Col. Boraston, who was said to have had at one time a larger number of readers than any other writer in Europe or America; and this could be very well understood having regard to the great interest attaching to Lord Haig's despatches, in connection with which Lieut.-Col. Boraston had played a most important part. As to Mr. Dickson, they congratulated him upon his substantial recovery from the serious illness with which he was stricken three years ago. He had almost since that time been a regular attendant at the meetings. The Directors regarded him as the Nestor of the Board. They referred to him on any knotty points and difficulties that had to be determined; and they never referred to him in vain.

Dr. CHARLES CARPENTER seconded the motion, heartily endorsing all the Chairman had said.

The motion was unanimously carried.

Sir JOHN BORASTON said he had been deputed by his colleagues to acknowledge the honour they had done them by re-electing them. They appreciated very highly indeed a seat on the Board, and each one would do his best to justify the confidence and the renewed confidence. If their native modesty caused them to blush when such generous terms were used by the Chairman, they had too much respect for his knowledge to challenge his opinion or to discuss it in any way. [Laughter.] He had been greatly touched by the reference made by the Chairman to the services of his son. He did his duty when the call came. He joined on Aug. 9, 1914; and he served until the end of January last. He said in his presence that he was proud of his record.

Mr. SAMUEL SPENCER proposed, and Mr. J. GILL seconded, the re-election of one of the Auditors (Mr. Alfred Morland, F.C.A.).

A VOTE OF THANKS.

Moved by the CHAIRMAN, and seconded by Mr. JOHN RANDALL, a hearty vote of thanks was passed to the Engineer (Mr. John Terrace), the Secretary (Mr. Wastell), their staffs, and the employees generally, for their admirable services.

EXTRAORDINARY MEETING.

An Extraordinary Meeting was then held to consider the following resolution:

> That the Bill now before Parliament, intituled "A Bill to authorize the South Suburban Gas Company to manufacture and store gas and residual products on certain lands and to raise additional capital; to alter the basis of charging by the Company for gas supplied by them; to amend the existing enactments with respect to the relation between price and dividend in the case of the Company; and for other purposes," be and the same is hereby approved, subject to such alterations as Parliament may make and the Directors may approve.

Dr. C. F. T. BLYTH (the Solicitor) explained the provisions of the Bill.

THE PROPOSED CAPITAL POWERS.

The CHAIRMAN: Dr. Blyth has explained the provisions of the Bill; and there are only one or two matters in connection with it that it may be desirable for me to mention. As to the land on which we are asking for powers to manufacture, it will be quite understood that this relates to several pieces which have been acquired from time to time as opportunity offered, and which adjoin the land acquired in 1914.

With respect to the additional capital powers asked for, may I remind you that, throughout the war, our capital expenditure was practically suspended; while, for all expenditure which was absolutely found necessary, the Company has for a long time been entirely dependent upon its bankers. Moreover, the increased cost of materials of every description means the carrying of stocks of much greater value than before the war; and we have now to look forward—possibly in the very near future—to the erection of new works at Belvedere.

THE HEAT UNIT BASIS OF CHARGE.

The proposed alteration of the basis of charge for gas follows the recommendations contained in what is known as the Beilby report, recommendations which form a completely new departure, and one of very great importance to the future of the industry. The report is the result of a reference by the Board of Trade to the Fuel Research Board (which is presided over by Sir George Beilby) to determine the conditions under which gas supply should for the future be carried on. It contains two chief recommendations, one being that gas undertakings shall be at liberty to determine for themselves, within certain defined limits, the calorific value of the gas they propose to supply; and the other, that the charge for gas shall be made upon a heat unit basis instead of, as heretofore, upon a cubic foot basis. It is clear that the first of these recommendations gives to gas undertakings greater freedom of action than they have ever enjoyed under parliamentary restrictions; while the second one secures to consumers the advantage of knowing what they pay for in actual heat value, and of comparing this with what they pay for electricity, the charge for which is upon a heat unit basis. The original report contained other conditions, to which strong and practically unanimous objection was taken; but, thanks to the action of the National Gas Council, these have been so far modified as to make the scheme a fairly workable one. The conditions, however, as a whole are much more onerous than those to which we have been accustomed heretofore. For instance, the calorific value of the gas is to be determined by a continuously recording calorimeter. Seeing, however, that they are of advantage to the consumer, we are prepared to carry them out to the very best of our ability.

FINANCIAL REVISION—THE COMPANY'S PROPOSALS.

In regard to financial relief, it is, I think, more or less an open secret that suggestions have been made to the Board of Trade by the National Gas Council as to the terms which, in the opinion of the Council, would be acceptable to the gas industry generally. Whether these terms will be embodied in the Bill which it is understood the Board of Trade have in preparation is not yet known; but we have felt it desirable they should be reflected in our Bill, so far as regards the proposed new standard dividend, new standard price of gas, and calorific power to be supplied; and they are so reflected accordingly. Recognizing, however, that present conditions are far from what we have been accustomed to regard as normal—particularly the uncertain duration of the present high level of prices—we feel it to be only right and reasonable that the standard price for gas, when definitely fixed under present conditions, should be subject to revision at the end of five years, during which we bind ourselves not to pay a higher dividend than the 6 p.ct. asked for as the new standard rate, and that thereafter there shall be further revision when needed, but not oftener than at intervals of five years. The object of this provision is to ensure that the standard price for gas should correspond, for the time being, with the cost of manufacture and distribution other than increase due to defective management, and at the same time to secure to the Company any advantage under the sliding scale attributable to the exercise of due care and management. In other words, the standard price will only be altered in regard to any change in working costs over which the Company have no control; while any reduction of such costs attributable to the exercise of due care and management will leave untouched the standard price and any sliding-scale dividend which the Company may happen to be earning. As the sliding scale has been for some time in abeyance, it may not be amiss to remind proprietors that, while it was in force, for every reduction of 1d. in the price of gas below the standard price, an additional dividend of 3s. 4d. p.ct. per annum was payable. Thus, at the present time, for every reduction of 1d. per 1000 c.ft. which means to the consumer a saving of about £10,500, the additional dividend, if payable, would amount to £1813, or about one-sixth of the sum. This is, of course, irrespective of the bonus formerly paid to co-partners, and which we hope before long to be in a position to revive. At the old rate, this would amount to about as much as the additional dividend. I hope I have made it clear that we are not seeking to take any advantage of present conditions to secure in perpetuity an abnormally high standard price, even though the position of the Company as having the lowest standard price throughout the London area might be a justification for asking for a permanent addition to it. But we venture to hope that in the Bill as it stands will be recognized a perfectly fair and moderate—perhaps too moderate—measure of relief from a position which is unjust to the proprietors, and injurious to the best interests of the consumers in hindering the economical development of the undertaking. He concluded by moving the resolution quoted above.

This was seconded by the DEPUTY CHAIRMAN (Sir Fortescue Flannery).

THE SIX PER CENT. AND CAPITAL RAISING.

Mr. SAMUEL SPENCER inquired whether the Board were going to ask the Government to give them only 6 p.c. Financial interests in the City were now offering 7 and 8 p.ct. If they were going to confine themselves to 6 p.ct. he did not know how they were to get money from the public.

The CHAIRMAN replied that they only bound themselves to 6 p.ct. for five years. That was the pre-war dividend. During the five years, the Board hoped that substantial changes would be made in the direction of reducing costs all round. If they now asked for anything like permanence for a high standard price, they would be met by the objection that it would not be fair to consumers to saddle them with this. At the end of the five years, there would be a revision, if the conditions warranted. Mr. Spencer overlooked the fact that the 6 p.ct. was on the ordinary stock, and that it would be subject to the operation of the sliding-scale.

Mr. SPENCER said it seemed to him that with 6 p.ct. in the present state of the market, they would not get any new capital. He thought they ought to ask for 7 p.ct.

The CHAIRMAN said the Directors were taking a more hopeful view of things. They quite agreed that 6 p.ct. was the minimum standard dividend they ought to ask for; but they did think the market price of the stock should be somewhere about par when paying 6 p.ct.

Sir FORTESCUE FLANNERY said there was no doubt that for companies issuing fresh capital at the present time, higher figures than 6 p.ct. were being offered. Even 7½ or 8½ p.ct. was being asked, and was expected. But this Company was a statutory one, and had a district assigned to it by Act of Parliament. This was a different position from that in which ordinary trading companies stood. Of course, they had electricity to contend with; so that it was not a monopoly. At the same time, as the Chairman had said, they believed their stock would be regarded in the market, even under present conditions, as fairly balancing at 6 p.ct.; and he did not think they would have any real difficulty—having regard to the high credit and character of the Company—in obtaining capital on their terms.

Mr. G. READ CLARKE asked whether the 6 p.ct. applied to new creations of ordinary stock, or to new creations of debenture stock?

The CHAIRMAN replied that they asked that it should apply to the ordinary stock, old and new.

The motion was unanimously carried.

GAS STOCKHOLDERS AND MEMBERS OF PARLIAMENT.

Mr. SPENCER suggested that gas proprietors should approach their members of Parliament, and get them to help them in obtaining relief from the iniquitous position in which the gas companies were. He thought that this would be a good thing.

Sir FORTESCUE FLANNERY said there was no objection at all to anyone interested in gas companies approaching his member of Parliament, and explaining the whole of the circumstances, and what he considered to be the fair and just duty of Parliament. He hoped all gas share and stock holders would do this.

The CHAIRMAN said it was the duty of all gas proprietors to do this.

VOTE OF THANKS TO THE BOARD.

Moved by Mr. CHARLES WEBB, seconded by Mr. E. W. DREW, a hearty vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN made acknowledgment on behalf of himself and colleagues. He remarked that the Directors were as anxious as any of the ordinary proprietors to secure better dividends than they were now receiving; and he did hope that either by their Bill or the Government Bill something would be done to place this Company upon a better footing.

CROYDON GAS COMPANY.

The Half-Yearly Meeting of the Company was held last Friday, at the Offices, Katharine Street, Croydon—Mr. CHARLES HUSSEY, J.P., in the chair.

The SECRETARY (Mr. W. W. Topley) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

INCREASED COSTS, BUT ADVANCING BUSINESS.

The CHAIRMAN said the proprietors would be sorry to learn that Mr. W. J. Russell, one of the Directors, was too unwell to attend that day. He was suffering from bronchitis and heart trouble. Moving the resolution for the adoption of the report and accounts, he said he thought the accounts which the Directors submitted might, having regard to existing conditions, be considered satisfactory. They compared not unfavourably with those of other companies whose circumstances were comparable with their own; and, though they bore witness in almost every line to the increased burden of costs, both of labour and materials, they indicated also a capacity of expansion and growth of receipts by which these costs might be met. In August last he referred to the tendency towards a rapid increase in the sales of gas, held in leash only by the then remaining restrictive regulations, and by the difficulty of obtaining supplies. They might congratulate themselves that since then the Government had removed all restrictions on the use of gas and coke. So far as the former was concerned, the increase of 150 million cubic feet in the half year, or nearly 20 p.ct., as compared with the corresponding period of last year, had amply borne out the opinion he expressed. The war had so far receded in their minds that one did not always realize how short a time it was since hostilities were at their height. During the greater part of the half year with which he was comparing, the country was daily making more and more strenuous efforts in the struggle it was engaged upon. The production of munitions of war was growing apace; and many industries in Croydon that were using large quantities of gas were in full operation. It would not be surprising if the reaction after all this strain were reflected in a slowing-down of business. The fact that in these circumstances the sales of gas showed such an increase as he had mentioned was eloquent testimony to an increasing recognition of the value of gas in the home, the shop, and the factory.

EXTENSION OF THE BASE OF BUSINESS.

It must be remembered that the increase in sales was attained after making up all the leeway arising from the closing-down of special war industries. Some of these had, he was glad to say, been converted to peace production, and others would no doubt follow; while they had yet to experience the demand which would arise when the many housing schemes which were in contemplation began to mature. In the half year they had increased the number of consumers by 540. With regard to stoves, those on hire were slightly less in number; but this was not for lack of demand, but was simply owing to the fact that the Directors had deemed it wise to supply—at all events for the present—by way of sale rather than hire. The proprietors would see that the sales (1730 stoves) showed a good increase.

THE PRICE OF GAS.

He explained at their last meeting the circumstances under which the Directors found themselves reluctantly obliged to increase the price of

gas from 3s. 11d. to 4s. 5d., and the consequent effect on the dividends of the "A," "B," and "C" stocks. The advance made was a small one compared with what many other companies found necessary; and the price remained, relatively to that in neighbouring districts, a very moderate one. The accounts showed very unmistakably the necessity under which the Board acted.

COMPARISON WITH THE LAST PRE-WAR PERIOD.

Though the economic and industrial conditions of the country were far from having yet settled into a condition of *post*-war equilibrium, they were able to form some idea as to prices under which they would have to work hereafter; and a comparison with the last pre-war period—that of 1913—was instructive. In that half year the cost of coal and oil was £58,972, or just over 1s. 6d. per 1000 c.ft. sold. It was now £137,150, or 2s. 11d., or £78,178 more. The expenses for wages and salaries were in 1913 £31,634, or under 10d. per 1000 c.ft.; now they were £78,978, or 1s. 8d. On the other hand, in 1913 the return to capital in the form of dividends was £23,599, or 7¼d. per 1000 c.ft.—one quarter of the price. For this half year, it had fallen to £18,036, or 4¾d. per 1000 c.ft.—less than one-tenth of the charge for gas, or in dividend less by £5563. And, be it noted, this was not due to inability on the part of the Company to earn a profit which would give them a fair return. It arose solely from the fact that the gas industry was, unlike any business, hampered by laws passed many years ago, when circumstances such as those of to-day could not have been foreseen, and were not even dreamed of.

EQUITY TO GAS STOCK-HOLDERS—THE PROMISED LEGISLATION.

Other industries could, if they had vitality, and if they were well managed, pay a good return to their shareholders when profits admitted of this being done. It used to be considered that shareholders in the gas industry, while limited in regard to dividends, had a reasonable assurance of these being maintained, and could, under the sliding-scale, secure in increased dividends some small share of the prosperity of the industry after, but not until, the consumers had obtained a much larger advantage. But now that circumstances wholly outside, and beyond the control of, the management had permanently raised the general level of prices far beyond what was contemplated in the past, the Directors could only take the absolutely necessary step of raising prices conformably—at the cost of reducing the dividends. Short of legislative action there was no redress. The urgency of this matter, both as one of equity to gas shareholders and of public interest (since it would be a very serious matter for the country were the gas industry crippled in any way), had been urged on the Government. The President of the Board of Trade, in reply to a deputation some time ago, stated that the Board were "fully alive to the importance of the gas industry, and to the need for seeing that it was not pushed to the wall." The gas industry awaited hopefully the introduction of a Government measure to make good these and similar earlier statements made on behalf of the Board of Trade. A Bill had within the last few days been introduced to remove the special disabilities of the gas industry in regard to raising fresh capital; but more than this was needed if gas companies were to be treated with fairness. Further legislation was believed to be in prospect dealing with the standard of quality by which gas was to be sold; and they were entitled to expect and demand that coupled with it should be provisions to ensure, under the altered conditions of to-day, fair treatment of the many thousands of people whose money was invested in gas stocks.

MAKE THE POSITION KNOWN.

He made no apology for referring to this subject at some length; for it was one on which next to nothing was known by the public at large, even by many members of Parliament; and he would strongly urge on all who were in any way interested in gas companies that they should lose no opportunity of making the facts known, so that they might have a reasonable chance of fair treatment when their case came before the House of Commons.

THE DOMESTIC GAS "ALLOWANCE."

The proprietors were probably all aware of the Government decision that the abatement from the price of coal, which was so suddenly and unexpectedly announced in December, was to be passed on to gas consumers for "domestic or household" purposes by way of a special allowance from their gas accounts, commencing with this current (Ladyday) quarter. The amount of the allowance in the case of each gas undertaking had to be assessed with regard to its individual circumstances. In the case of this Company it would be for this quarter at the rate of 6d. per 1000 c.ft., and it might be varied in subsequent quarters. In any case, they were merely the channel by which the allowance passed to their consumers. The Company had the trouble of administering it. But beyond a small proportion allowed to meet the out-of-pocket expenses they got no advantage from it; and it did not benefit the proprietors in any way.

A GOOD INVESTMENT FOR CONSUMERS AND EMPLOYEES.

It would be seen by the report that the Board (having obtained the assent of the Board of Trade) were issuing to consumers and employees "D" stock at a price which yielded a return of 6¼ p.ct. on the investment. This offer was still open; and the Directors hoped that many of the consumers and employees would take advantage of it. He found that just one-half of the shareholders (who numbered now over 3000) lived in the gas supply district, and were, therefore, interested in the Company both as consumers and as proprietors. About 500 of these were also employees, who had yet a further interest in the Company's welfare and progress. This linking-up of interests was, he believed, good for all concerned.

WORK ON PLANT RESUMED.

It had now become possible to resume work (suspended during the war) on the new gasholder; and the Company were also engaged in laying a number of high-pressure mains to supplement the supply to outlying districts, with the view of maintaining a satisfactory pressure of gas under present and future conditions of growth. This meant, of course, the spending of a great deal of capital to meet these requirements.

AS TO THE FUTURE.

With regard to the immediate future, the outlook for residuals seemed good, though later, if increased supplies of coal became available, the price of coke would tend to readjust itself. They would probably have to face severe competition, in regard to sulphate of ammonia, with other artificial manures. The demand for tar products continued good; and the price of this residual appeared likely for some time to come to be favourable. A recent award in regard to wages would, however, he was sorry to say, add considerably to the cost of labour in the current half year. The half-year's trading would enable them, after payment of the statutory dividends, to carry forward £1679.

The DEPUTY CHAIRMAN (Mr. Thomas Rigby), in seconding the motion, said he was afraid the proprietors would think the report and accounts somewhat disappointing. At the same time, in the circumstances under which they had been working lately, he believed they would consider them not unsatisfactory. A short time ago, the Board were hopeful that they would be able to submit a much better report; but their anticipations had not been fulfilled. However, they were not despondent. The Company had a splendid district, which was not yet fully developed; and he believed that, under ordinary conditions, the Directors would be able to supply a much better report than they had done this year.

Mr. CHARLES WEBB, referring to the issue of £100,000 "D" stock to consumers and employees at £80 p.ct., asked whether it would not be possible for an outsider like himself to have a "look in." There were many outsiders who had money to invest; and he was sure they could not have a better investment.

The CHAIRMAN said by their Act of Parliament they were unable to do that. As he had indicated in his speech, the Government had a Bill in Parliament which, if passed, would allow them to do what Mr. Webb wished. If, however, application was made to the Secretary, he might be able to find a way of getting out of the difficulty.

Mr. WEBB remarked that the reason he asked the question was that he did not think the Directors would, if they could extend the offer, have the slightest difficulty in getting what they wanted.

The CHAIRMAN said he was certain of that, if they could put the stock up to auction. But they could not sell the stock under par, except to consumers and employees who lived in the district.

Dr. G. H. RODMAN thought there was one point that might be made a little more plain to the proprietors. There was a new item in the balance-sheet in connection with the coal rebate. It was a matter of £3092. It appeared that the gas allowance started from January, while the coal rebate began on Dec. 1.

The CHAIRMAN replied that the 10s. per ton rebate started on Dec. 1; and the estimated equivalent of the gas allowance for domestic purposes was in their case 6d. per 1000 c.ft. This was as near as they could possibly compute it. The gas allowance would be made upon the present quarter's accounts, which would include the coal rebate from Dec. 1.

THE DIVIDENDS—THE RETURN ON MONEY INVESTED.

Mr. WILLIAM CASH proposed the declaration of dividends at the following rates per annum: 10½ p.ct. on £51,600 of "A" stock, 7½ p.ct. on £178,400 "B" stock, 7½ p.ct. on £100,000 "C" stock, 5 p.ct. on £165,155 "D" stock, 7½ p.ct. on £25,000 "E" stock, and 5 p.ct. from the date of allotment on £24,550 "D" stock issued in December, 1919, all less income-tax. He remarked that it might be said by an outsider not familiar with their affairs that these dividends did not seem at all a bad return on the capital invested in an undertaking in these days; but it was very important to remember—from their point of view it ought never to be forgotten—that these dividends, while declared on the nominal amount of capital, were really a return to the stockholder on the amount of money he had put into the undertaking. For the stock, in the majority of cases, the holders had paid a substantial premium. Under the statutory regulations, the stock had been issued by tender or auction; and if they looked at the capital account "C," it would be seen that the Company had received no less than £130,416 by way of premium on the two classes of "B" and "C" stock. If they added the premium to the capital on which the dividend was paid, the "B" and "C" stockholders' actual return was only 5 p.ct.; and if they took some of the recent issues of "B" stock, the return to holders on the money actually subscribed was only 2¾ p.ct. These were facts which those who were concerned in the direction of gas companies were very anxious to impress on Parliament, and which led them to say the gas industry was in need of assistance, and a revision of the terms on which they carried on their undertakings. If they were conducted on the lines that there should be adequate remuneration to labour (which was a consideration to which they would all subscribe), it was equally true that there must be an adequate return on the money put into the undertakiug. If they had regard to the figures he had given, and then considered that they had now to issue stock at a price that would pay about 6¼ p.ct., he thought they would all agree that the case for consideration for the old stockholders was absolutely overwhelming. The Directors would like, of course, to be able to say that there was some prospect of their paying larger dividends than they were doing this half year; but when the increased cost of labour (which would fall upon them this year due to the last award of the Industrial Committee, and which dated back to Dec. 1) was taken into account, and the fact that they had to bear increased burdens for railborne coal, and there appeared to be no immediate chance of a reduction of freights for the coal brought to the Thames from the North, the idea of increasing the dividends was not likely to be fulfilled for the moment. As the proprietors knew, the only way the Directors could give an increased dividend on the invested capital was by first of all reducing the price of gas; and therefore, in the circumstances, the time was ripe for a revision of their constitution and statutes. Subject to these observations (he did not want to depart from the remarks made by their Chairman and Deputy-Chairman), they had nothing to despair about. He did not suggest that the undertaking was in such a parlous state that they need be concerned about their investments; but rather to say that the gas industry was hampered in a way peculiar to its constitution, and in a way which called for relief, to which they were entitled. These were views to put before

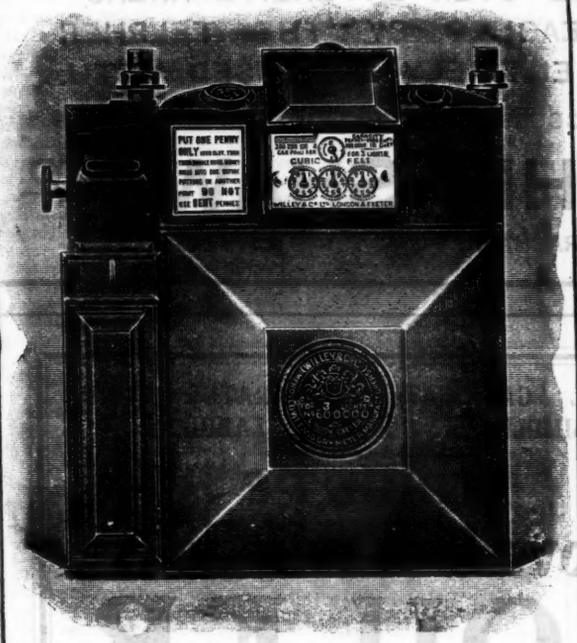
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & Co., LTD.,

Exeter, London, Manchester, Leicester.

Telegrams:
"WILLEY, EXETER."
"GASVILLADO, KINLAND, LONDON."
"METERS, LEICESTER."
"WILMETER, MANCHESTER."

Telephone Nos.:
123 EXETER.
234 DALSTON, LONDON.
4777 LEICESTER.
7419 CITY (MANCHESTER).

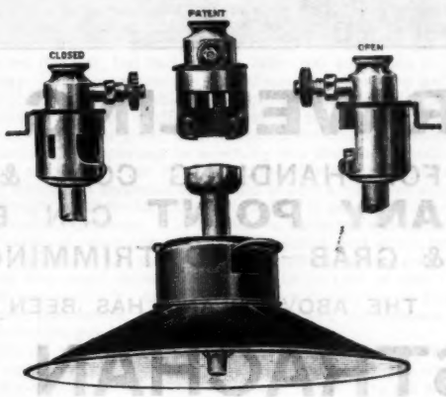
LONDON WORKS & OFFICES:
89-95, Hertford Road, Kingsland, N.
LEICESTER:
5, Oxendon Street.
MANCHESTER:
John Street, Booth Street West, S.W.
AGENTS FOR SCOTLAND:
D. M. NELSON & CO., 20, WEST CAMPBELL ST., GLASGOW

NEVILLE'S Lift-Off Burners

PATENT

(Swings and Takes up Vibration)

Immediate Delivery from STOCK.



FACTORY BURNER.

Best British Make Throughout.
Practical, Strong, and Durable.
Reflector Thickly Enamelled.

Pneumatic Distance Lighter

Enables Gas to be Switched-on with the same ease as Electric Light.

See Stand No. 49,
BUILDING "A," BLOCK "F,"
British Industries Fair,
BIRMINGHAM.

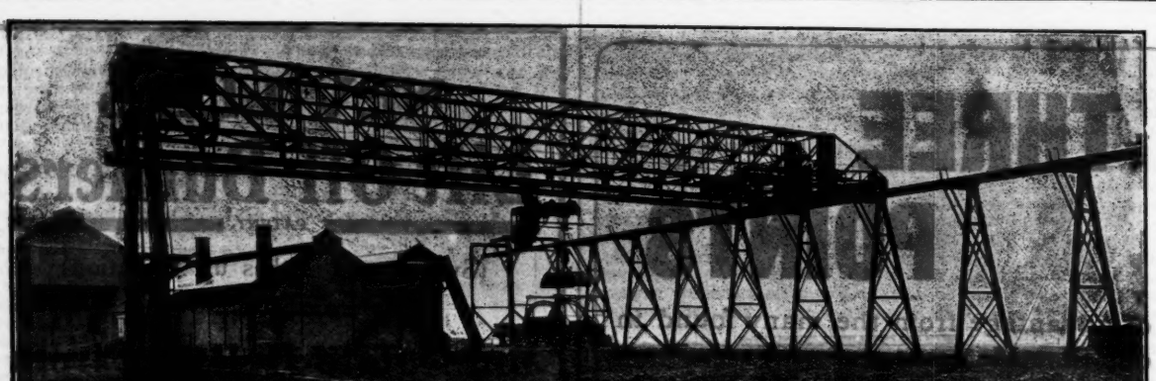
SOLE MIDLAND AGENT: G. H. BANNING, Criterion Works, 33, Hurst St., BIRMINGHAM.

Manufacturers and Patentees:

PNEUMATIC GAS LIGHTING Co.

36, Farringdon St., London, E.C.4. LTD.

Telegraphic Address: Omnibusses, Cent. London. Telephone: 2123 Holborn



TRAVELLING TELPHER TRACK

FOR HANDLING COAL & COKE OVER EXTENSIVE AREAS—
ANY POINT CAN BE REACHED BY THE TELPHER
& GRAB—HAND TRIMMING IS ENTIRELY DISPENSED WITH.

THE ABOVE PLANT HAS BEEN IN SUCCESSFUL OPERATION FOR 2 YEARS.

STRACHAN & HENSHAW, LTD.

TELEPHONE 432. TELEGRAMS. "STRASHAW." BRISTOL.

USEFUL GAS-HEATED APPARATUS THAT SIMPLIFIES DOMESTIC LABOUR.

WRIGHT'S "Novo" Wash-House BOILER

is strongly constructed, fully meeting the need for a Boiler giving durability and good service at a moderate price. It is particularly suited for use in Housing Schemes and in Homes wherever space is limited and saving of time and labour is desired. The Boiler is made with a cast-iron outer case and a cast-iron pan bower-barffed as a protection against rust. It is raised on legs to a convenient working height and has a removable wooden lid giving free access to the Boiler all round.

Capacity - - - - 10 gallons.

JOHN WRIGHT & CO.,

Essex Works, Aston.
BIRMINGHAM.

Parliament, and to induce the Board of Trade to impress upon Parliament, to the end that gas undertakings might get relief in this direction.

Mr. H. WOODALL seconded the resolution, which was unanimously carried.

RE-ELECTION OF DIRECTORS AND AUDITOR.

The CHAIRMAN proposed the re-election of Mr. Thomas Rigby as a Director. He believed that Mr. Rigby joined the Board the same year as himself, which was a "few" years ago. The proprietors knew the Deputy-Chairman took the greatest interest in the affairs of the Company, which was very much larger than when they joined it.

Mr. SAMUEL SPENCER seconded the motion, which was heartily agreed to.

Mr. RIGBY having responded,

Mr. PERCY H. HALL, J.P., moved the re-election of Mr. Henry Woodall. There was no need to mention Mr. Woodall's qualifications. He and his family had been well-known to the Company for many years. His father, the late Sir Corbet Woodall, was a Director for a very long time; and during that time, the Company derived the greatest advantage from his immense experience in the gas world, both as an engineer and as an old parliamentary hand. Mr. Woodall had now been a Director for three years; and during that time he had been of the greatest assistance to the Company, and the Company were greatly indebted to him for his services. They had difficult times still to go through, more especially in engineering matters. Mr. Woodall had been a tower of strength to the Company. He was a Director of the Gas Light and Coke Company, and of other large companies. This was a sufficient qualification, because they had the benefit of his great experience.

Mr. SAMSON seconded the motion, which was heartily carried.

Mr. WOODALL having replied,

Dr. RODMAN moved, and Mr. SAMSON seconded, the reappointment of Mr. F. S. Sloman as an Auditor.

The motion was unanimously adopted.

VOTES OF THANKS.

Mr. CHARLES WEBB, in moving a vote of thanks to the Chairman and Directors, said the proprietors were receiving reduced dividends, but not on account of bad management. They were living in hope of better times; and he thought the sky was brightening. Although gas companies were getting reduced dividends, and had such heavily increased expenses, there were people who thought they were out for profiteering. He only wished gas companies were paying 50 p.ct. dividends; for then the public would be getting gas at next to nothing. [Laughter.] Parliament could not really expect gas companies to go along with a 3 p.ct. dividend, when the Government themselves could not get money even at 5 p.ct. With the difficulties gas companies had passed through the Directors had had great anxiety. But they were hoping for better times; and so long as they were in the hands of the gentlemen sitting the other side of the table, they need not have the slightest fear as to the success of the Company.

Alderman MARTIN TAYLOR seconded the motion, which was cordially passed.

The CHAIRMAN, on behalf of his colleagues and himself, thanked the proprietors most sincerely. He remarked that it was with great regret they had to show lower dividends on this occasion; but they had no choice with the high prices of coal, oil, wages, and everything else. They hoped that the promised Government Bill would place the Company in a much better position, and that they would before long be able to resort to something like the old dividends. Of course, they might be disappointed; but, if they were, they must take it as philosophically as they possibly could. He proposed that their best thanks be given to the officers, staff, and employees for their efficient services. He could not say more than he had said on previous occasions, that the whole of their staff took the greatest interest in the undertaking, and did the best they could in their respective positions. One and all deserved the heartiest thanks for the capable way in which they carried out their duties. Their Engineer had been worried by the Government in all directions; and their coal stock had been reduced to a lower level than they liked it to be. But he was happy to say they were not so badly off as many other companies; and their stock, although lower, was not reduced to an extent over which they need worry.

Mr. SPENCER seconded the motion, which was unanimously carried.

Mr. A. CADDICK (Engineer and Works Manager) thanked the Chairman, Directors, and proprietors on behalf of all concerned for their kind recognition of their services. He was sure the vote would be received with very much pleasure.

Mr. TOPLEY, on behalf of the secretarial, accounting, and collecting staffs, said he had been supported most loyally; and he was sure all engaged in these departments would appreciate very fully the recognition of their services. One figure that had been familiar to the proprietors who had been in the habit of attending these meetings was absent that day. He was sorry to say the Assistant Secretary (Mr. Anderson) had, through a serious breakdown of health, been obliged, on the advice of specialists, to retire, and seek prolongation of life under conditions of rest. The next senior assistant in this (the secretarial) department had been offered, and had accepted, an important position in a large Company. One of the other senior members of the staff had received from the Directors a well-deserved promotion to the post Assistant Secretary. Though there had been many other changes in consequence, there had been no change in the spirit of loyalty which had characterized the whole staff.

Mr. W. J. SANDEMAN (Distributing Engineer and Sales Manager) thanked the proprietors on behalf of his staff. They all endeavoured to do the best under very difficult conditions. In regard to the future, he was optimistic. He thought the time was not far distant when their difficulties would grow much less than they were now. As the Deputy-Chairman had said, the Company had a magnificent district; and they meant to make the very best of it.

The address of the Department of Scientific and Industrial Research has been changed to Nos. 16-18, Old Queen Street, Westminster, S.W. 1.

LIVERPOOL GAS COMPANY.

Annual Meeting.

The Annual Meeting of the Company was held last Tuesday, at the Offices, Duke Street, Liverpool—Mr. H. WADE DEACON (the Chairman) presiding.

In moving the adoption of the report and accounts, he said that the Company had had to meet an increased demand for gas, though restrictions were in operation for the greater part of the year. The increase in sales had been 4·38 p.ct. for the year; and owing to the difficulty of obtaining supplies of coal, they had actually carbonized 17,500 tons less than in 1918. They had been obliged to use a greater quantity of oil. As the price of coal had not increased by nearly as high a percentage as the price of oil, they had been handicapped, and the cost of manufacture had in consequence naturally risen considerably. The pre-war price of coal was about 13s. 6d. per ton; and it was now 33s. 5d.; while the pre-war price of oil was about 2¼d. per gallon, and it was now 8¼d., and after March next it was expected that it would be 11d. They had never been free from anxiety about the coal supplies, and were by no means free to-day. At one period the anxiety was very acute; and the Directors felt obliged to issue warning notices to consumers. Fortunately, there had not been a severe winter; but the coal stocks had never been so low. It was not only the quantity of coal supplied that affected them, but also the quality. For several years they had not been allowed to buy coal of the kind they had before the war, but had had to take coal and slack of very inferior quality. The consequences were disastrous; for they had not been able to obtain as many cubic feet of gas per ton, the inferior coal produced coke of inferior quality, the labour required was greater with poor coal than with good, and therefore the cost had increased. What was perhaps as important as anything was that the capacity of the plant was reduced. Last November, the Government issued an Order under which gas undertakings would collect a rebate of 10s. per ton of coal bought by them for the manufacture of gas used for household and domestic purposes. The amount so collected was converted into an equivalent of pence per 1000 c.ft. of gas sold, and was to be distributed, on the basis of gas used, to such consumers as were entitled to it. So far as they could estimate, the rebate in the case of their Company was 6d. per 1000 c.ft., and this amount was now being allowed to prepayment consumers, and would be allowed to ordinary consumers in their next gas bills.

With reference to the accounts, owing to increased prices of coal, oil, and all materials, and increases in salaries and wages, the costs of manufacture were naturally very much higher. Since 1914 the amount paid in salaries and wages had risen from £185,838 to £463,979; and as some of the increased awards had not been in force for the whole of the year, the amount for 1920 would be much larger still. As they had sold more gas and at higher prices, the income was greater; and the revenue account showed an increase in receipts from sale of gas of £172,082. They had received more for residual products as a whole—especially from coke. The total receipts were £1,431,700; and after deducting the expenditure of £1,370,718, there remained a balance of £60,982 to carry to net revenue account. After making provision for a dividend for the half year at 1¾ p.ct., there remained a surplus of £21,828 to carry to next year's account. The surplus at the end of 1918 was £49,932; and in order to enable them to pay the dividend authorized by the Board of Trade, they had had to reduce this surplus by £28,104. In the existing unsettled state of things it was a very difficult task to make any accurate estimate for the future. The Directors had gone into the matter with a great deal of care; and, after full consideration, they had based their estimate on prices and rates of wages as they were to-day. Should there be any serious increases in the future, it might be necessary to revise their figures with a corresponding alteration in the price of gas. But on the assumptions they had made, he was glad to say they could reduce the price of gas by 2d. per 1000 c.ft., which would be acted upon as soon as the necessary tables of the values of consumptions at the altered price could be prepared and printed.

After some discussion, the motion for the adoption of the report and accounts was carried with two dissentients; and thereafter a dividend for the half year on the ordinary stock of 1¾ p.ct. was declared.

DERBY GAS COMPANY.

Interest in the proceedings of the annual meeting of the Derby Gas Company, held on Friday, under the presidency of Mr. J. W. Newbold, J.P., was accentuated by the fact that it was the centenary year of the undertaking. The Chairman, in moving the adoption of the report, pointed out that the financial statement indicated a successful year's work, notwithstanding a further reduction of the dividend by ¼ p.ct. This was due to circumstances over which they had no control; for, in common with other gas undertakings, they had passed through a trying period. Part of the price to be paid for the war was a great shortage of coal, a general scarcity of all commodities, and extravagant prices in every direction. Dealing with salient features in the accounts, he directed attention to the fact that the total revenue for the year reached the high-water mark of £334,677, being an increase of £40,565 upon last year. The profit of over £40,000 was higher than in 1918, but less than in pre-war days. Consumers had every reason to be satisfied with the low price of gas in Derby; and to manufacturers bent on development who used large quantities it should be an inducement to remove to the Midlands. In regard to the future, the outlook from a business point of view promised to surpass all records. Mr. W. Woolley (the Deputy-Chairman), who seconded the resolution, said that, unless they obtained some relief by the Bill which the Board of Trade intended to introduce to amend the sliding-scale, they would be forced to take steps themselves to promote a Private Bill for the purpose. The dividend they were allowed to pay upon the present basis was too absurd for words. With the present return from Exchequer Bonds, it was madness to invest in gas shares. The report was

adopted, and a dividend agreed to for the half year of 2½ p.ct. The Chairman announced that during the continuance of the rebate on coal the price of gas used for domestic and household purposes would be reduced by 6d. per 1000 c.ft.

The following sketch of the Company's history, in connection with the centenary year, was given by the Chairman.

The first general meeting of the Company was held at the Town Hall on July 8, 1820; the Chairman being Mr. William Strutt, a name deservedly honoured and respected in the county of Derby.

In 1865, the total quantity of gas made only reached 125 million c.ft. During the first 25 years, the growth was slow; but in 1890 the quantity had increased to 410 million c.ft.—being over three times the total made in 1865. Since 1890 the increase has been rapid. In 1900 the quantity made was 580 millions. Subsequent to that, it is necessary to proceed in periods of five years, as expansion during the last twenty years left all records far behind.

1900	gas made	580	million c.ft.
1905	,,	636	,, ,,
1910	,,	963	,, ,,
1915	,,	1180	,, ,,
1919	,,	1500	,, ,,

In 1902 the Company purchased by agreement the Duffield, Quarndon, and Allestree Gas Company; and in 1906, the Spondon, Ockbrook, and Borrowash Gas Company, and the Mickleover and Etwall Gas Company. These transfers were followed in 1908 by the purchase of Mr. Strutt's gas-works supplying Milford and part of Belper, and the Belper Gas Company, who supplied Belper and adjoining district. Further, in 1907 the Midland Railway Company decided to discontinue making gas at their own works, and to take a supply from the Derby Gas Company in bulk. The quantity so taken is large, being equal to the supply of a moderate-sized town.

BOURNEMOUTH GAS AND WATER COMPANY.

The Ordinary General Meeting of the Company was held on Friday last, at the London Offices, No. 90, Cannon Street, E.C.—Mr. William Cash, F.C.A. (the Chairman), presiding.

The Secretary (Mr. H. A. Plumb, F.C.A.) read the notice convening the meeting, and the minutes of the previous meeting; and the Directors' report and the statement of accounts were taken as read.

Gas Prices, Dividends, and Coal Cost.

The Chairman, in moving the adoption of the report and accounts, said that the first observation he would make on the subject of the accounts as a whole was that the half year just ended, regarded from this point of view, had been a satisfactory one. That was to say they had earned the dividend which the Direcrors were recommending should be paid, and had added to the carry-forward the substantial sum of £8000. But this had been done on the following lines. The price of gas had been increased from July 1 by 4d. per 1000 c.ft.; and the Directors had found it necessary again to put it up from Oct. 1 by a further 4d. These two increases together brought the price up to 4s. 6d. per 1000 c.ft., which compared with a pre-war charge of 2s. 6d. The effect on the Company from the point of view of the shareholders was that the dividend on the ordinary stock had now been reduced to the standard rate authorized by Parliament when it was fixed a great many years ago. To the holders of these shares this was a distinct hardship, because they had paid high prices for their shares, or they had inherited them at values on a like basis, and their dividends now had suffered a considerable reduction from that which was paid in pre-war times. This arose, of course, as the proprietors had been told on previous occasions, from circumstances which were really beyond the control of the Directors. Had it not been for the fortunate fact that the Company had raised their capital on extremely favourable terms, the position would have been much worse now than was actually the case. On the total subscribed capital (including the very large premiums which appeared in the capital account, of over £200,000) the return based on this half-year's dividend was only 5·198 p.ct. As was known to those present, the price of coal to gas undertakings was raised by 6s. a ton in July last; and it was mainly this which necessitated the addition of the second 4d. to the price of gas. But the immediate effect of the 4d. rise was to reduce by 1 p.ct. the dividend on the original shares. This Company, in common with many of the south-coast gas undertakings, were particularly affected adversely by the high rates of freight which they had been obliged to pay. Going back two years, the highest rate of coal and freight paid in 1917 was 35s. 9d. per ton; whereas during the half year which had just elapsed they had had to pay as much as 55s. 6d. per ton. The result of the increased cost to which he had alluded was that over the whole of the six months (because, of course, they started the period with stocks at a somewhat lower figure) the gross cost of coal was increased, as compared with 1918, by 4s. 8d. per ton. Thus the net cost of coal for carbonizing, after deducting residuals, was more by nearly 3d. per 1000 c.ft.

Labour more expensive.

Coal, however, was not the only adverse factor. Along with all other gas undertakings and most commercial concerns, they had had to meet substantial increases in the charge for labour. The total wages paid by the Company in the last pre-war year (1913) were £43,500; while in 1919 the wages bill came to £93,350. In the half year under review, to take one item only, wages for carbonizing had increased as much as £3600. On the last occasion that he had had the privilege of addressing the proprietors, he had held out some hope that it might be possible in the half year just concluded that they would find themselves with a less charge under the heading of maintenance of works, due to the fact that in 1918 they were carrying out some exceptional repairs—not in consequence, as would be readily understood, of any decrease in the cost of wages and materials *per se*. This had eventuated; but, on the other hand, there was an increased cost of distribution and for repair and maintenance of stoves.

Largely increased output—coal price fluctuations.

The satisfactory feature of the half year was the very substantial increase of no less than 24½ p.ct. in the output of gas. Of course, this contributed to swell the figures on both sides of the revenue account; but it had assisted them in so far as the standing charges had been spread over a greater output. He would like briefly to allude to one matter which affected all gas undertakings, and which might be regarded in a sense as a national question. When the price of coal was raised by 6s. a ton, the Company were asked to bear the whole of the burden; and this had the direct effect of immediately reducing the dividend paid to the shareholders. Now the Government had seen fit to reduce the price of coal to the domestic consumer; and gas companies were to have a rebate of 10s. a ton on all coal used for domestic gas supplies as from Dec. 1. Coupled with this arrangement was the provision that the whole of the benefit was to be handed over to the consumer. It really did seem to him to be a most inequitable procedure that, after the shareholders had borne the burden of the increased cost, now when a reduction was determined upon no benefit whatever was to accrue to the Company, except a small allowance of 5 p.ct. which they were entitled to retain towards the expenses of administering this very complicated and troublesome Order. No doubt, they would have seen in the Press that some companies were able to allow a substantial rebate under the Order to domestic consumers, because of the fact that the whole of their gas was made from coal. In the case of a Company like their own, where a substantial proportion of the output was carburetted water gas, inasmuch as the allowance was only calculated on the coal (which constituted only a portion of the raw material used) they were not in a position to show such a large amount, expressed in pence per 1000 c.ft. of gas, for the consumer. Of course, they would loyally carry out the instructions issued to them, and would ultimately hand over to the consumers the whole of the rebate which was received by the Company. They had, in fact, begun to do so, by allocating, as from Jan. 1, both to prepayment and to ordinary domestic consumers a rebate of 5d. per 1000 c.ft. during the current quarter. If there proved to be so large a sum available that the rebate could be increased, of course this would be done. He thought the sympathies of all of them ought to be extended to the officers who had had to contend during the past half year with very grave difficulties arising from another aspect of the coal question—that was, the quality of the coal with which they had been supplied. In their particular case, also, they had had to contend against a rather serious coal fire in the stores at Bournemouth, which had the effect of somewhat reducing the make per ton, and also the value of the residuals—especially coke. Turning to the water department, it would be seen that the income was up by some £500. This was, in a sense, rather surprising, when it was reflected that building and extensions of the population within their area had been restricted during the war. They had also come out with quite an exceptional profit on the fittings department, due to the fact that the consumers had bought a large number of fittings, which the Company had stopped hiring-out.

The Government Bill.

He did not want to detain them by saying anything about the Bill which the Board of Trade had promised for the relief of the gas companies as a whole. He believed this promise would be adhered to and that this over-due measure of justice to gas undertakings would be sanctioned by Parliament. At the present moment, the Company had no new capital issues in prospect, and as far as possible they proposed to defer any capital expenditure; but the time would come when this would have to be undertaken, and their new Act gave them a much freer hand than they had before with regard to the terms upon which such an issue might be made.

Retirement of the Engineer and General Manager.

Another matter which he looked upon as of considerable importance, and which the proprietors would regard as of great interest, was the retirement from the position of Engineer and General Manager of the Company of their very good friend Lieut.-Col. Harold Woodall. He would like to say that this had been brought about because Lieut.-Col. Woodall felt that he would prefer to have greater freedom and scope for his untiring energies and his abilities, so that he might be in a position to develop other interests which he had at heart outside their own Company. Lieut.-Col. Woodall had gained a very wide knowledge of men and affairs in India, where he served his country with great brilliance during the war. He was, however, happy to say that the Directors had been able to retain the benefit in a consulting capacity of Lieut.-Col. Woodall's experience and knowledge of the undertaking. He had been General Manager now for some nineteen years; and during this period the Company had made an extraordinary advance. When their friend joined them in 1900, the output of gas was 325 million c.ft. In 1918 it was 1215 millions; and last year the figure had reached 1286 million c.ft. This would give them some idea of the progress that had taken place. He knew that Lieut.-Col. Woodall's services as consultant would be given just as freely and as readily as had always been the case while he had occupied the position of their chief officer. They wished him full success in everything to which he might put his hand; and there was very little doubt that this success was assured. They were in a fortunate position, with regard to a successor, in having with them Mr. P. G. G. Moon. He (the Chairman) had told the proprietors at each meeting while Lieut.-Col. Woodall was away in India, that Mr. Moon was carrying on the undertaking with great ability; and the Board had now appointed him to succeed to the position of General Manager. They were equally fortunate in having a staff subordinate to Mr. Moon who could be moved up; so that they would not find it necessary, he thought, to go outside their own borders—which was a very satisfactory state of affairs. If they could encourage their subordinate officers by promotion, he was sure the shareholders would agree that this was the proper course to pursue.

Looking forward.

Looking forward to the next half year, they would be aware that labour had made a further demand, and that increased wages had become operative as from Dec. 1 last. Also they had had to meet some extra charges on their railborne coal. Probably they all knew that the

chain of councils was now practically complete. There was a joint industrial Council, for the whole of the gas industry; there was a Regional Council (of which he had the honour to be Chairman) for the Southern District; and there were now to be Works Committees. Their Company were fortunate in already having a Works Committee at Bournemouth; so that this would not be any innovation to them. Of course, it was only fair to bear in mind their increased business; but they did find that they had to employ more men than formerly. and this was partly due to the fact that they had reduced the number of hours under the arrangements and awards that had been given effect to. The increased demands of labour were based upon the higher cost of living; but he really did think the men and their leaders were now beginning to realize that every time increases of this character were granted, they were immediately followed (as they must be automatically) by a corresponding rise in the cost of living. What he ventured to think the nation had to realize was that, as a nation, they were really poorer; and the idea (which seemed pretty general) that, as the result of a European war of the character in which England had been so materially involved. no one was to suffer and be any the worse off, was a fallacy. Continual denial of the intention to bear any of this burden was really impossible of realization. The mere increase of nominal income was a fallacy, which was proved by the high prices now existing. Since Dec. 31, they had converted their original shares in the terms of the Act; and this was the last occasion also, because of the same Act, on which they would assemble as a half-yearly meeting. In future their meetings would be held once a year; but they would pay an interim dividend for the half year ending June 30 at about the usual date. For this reason, it might interest them to glance at some of the yearly figures with which they would henceforth have to deal. Their sales of gas last year amounted to nearly 1286 million c.ft., which was an increase of 8·51 p.ct. over the complete year 1918. The carry-forward over the year had been increased by some £6470; and they had paid off, as they were authorized to do, a substantial portion of the costs of the parliamentary proceedings. The dividend for the past half year was at the rate of 10 p.ct., which meant that for the whole year it would be 11 p.ct. One other interesting figure which reflected great credit on the management was that the leakage for the year had been only 4½ p.ct. The water revenue for the year had been £950 more than for the previous twelve months. These totals would be useful when they came to compare yearly results, as they would have to do in the future.

"Domestic" Consumption.

The Right Hon. Sir Daniel F. Goddard, in seconding the motion, said the speech of the Chairman had been very complete. It had given them a great deal of information, not only as regarded their own particular Company, but also with reference to the general position of gas undertakings throughout the country. It was not a very happy position; and it was impossible to feel quite satisfied with it—especially knowing that the depreciation in the value of their stocks was in no sense attributable to any neglect or mismanagement on their part, but was inflicted upon their Company and all gas companies by those peculiar orders which had come about from time to time, in a manner that was rather difficult to explain. Some of the orders were incomprehensible; but they had left their mark upon them. There was, for instance, that unfortunate increase in the price of coal last July of 6s. per ton, which was sprung upon gas undertakings at a most inconvenient period, because, without taking a special reading of all the meters, they could not possibly raise the price of gas to equalize the increased price of coal. It was not until the end of the September quarter that they could put themselves on a proper basis. This was a great injustice. Then, of conrse, at the end of November came the order for a 10s. reduction in the price of coal used for domestic purposes. He frankly could not help saying that he thought the Government would have treated the people more fairly if they had said: "When we put on that increase in price in July, we made a mistake; and having made a mistake, we will take off a certain amount all round"—instead of allocating it specially to that part of the coal utilized to meet domestic requirements. The proprietors were aware that the difficulties of arriving at exactly what was domestic gas were very great, and in many cases no doubt gave rise to great injustice. He himself failed to understand it. Such places as theatres, cinemas, and music halls all obtained this rebate off the price of gas. They were considered to be domestic supplies; whereas dairies, bakeries, and laundries did not get the rebate, as they were not considered to be domestic supplies. It was very unfair. And in many cases it became even more unjust than this. This was so where an industry was carried on in a man's home. Frequently working tailors and working shoemakers carried on their business in their own homes. The tailor had to have his irons heated by gas. This was industrial gas, and not domestic, and he got no reduction; but if, under the same roof, in the kitchen, he had his boiling-ring, this was domestic gas, and he was entitled to the rebate. But how their officials were to distinguish between the two, was one of the problems which was not easily going to be solved. Some people were apt to think that too much might be spent on repairs and maintenance; but in his judgment it was difficult to do so. The great principle of a gas undertaking should be to keep its plant in the best possible condition; and if the item of repairs and maintenance increased, he did not think any proprietor should grumble, because, though it might for the moment reduce the profit, in the end it would stabilize the concern and add to its value.

Coal Quality and Gas Production.

Mr. Charles Webb asked whether the coal was any better in quality now than that which they had been receiving, and whether there was any chance of it getting back to the old-time quality. What did the make of gas per ton of coal average now, and how did it compare with pre-war?

The Chairman replied that they would be very pleased indeed if there were any indication (which there was not at present) that the quality of the coal, taken as a whole, was any better than it had been during the last six months. They did what they could in the way of expostulation, and by testing the coal as they received it; but he could not say that they had been much more successful than other companies in securing any substantial relief. With regard to the quantity of gas made per ton, they were of course down somewhat; and this was due both to the poor quality of the coal and to the trouble they had had with the fired coal which they had had to use. Notwithstanding this, during last year the quantity of coal gas made per ton was only a little under 12,000 c.ft. This reflected great credit on Lieut.-Col. Woodall and the other officers. Of course, he need not point out that this was not the only test applied in modern practice, because they were supplying a mixed gas at Bournemouth, and it was necessary to have regard also to the carburetted water gas and the relative values of the two gases both before and after they were mixed.

The resolution was then put, and carried unanimously.

The Dividends.

On the proposition of the Chairman, seconded by Lieut.-Col. Charles L. Morgan, C.B.E., the statutory dividends were declared, for the half year, at the rates per annum of 10 p.ct. on the original shares, 7 p.ct. on the "B" ordinary shares, and 6 p.ct. on the preference shares.

Retiring Directors and Auditor.

Mr. William Cash was re-elected a Director, on the proposition of Sir Charles J. Jessel, Bart., who said, as one having some experience of chairmen, that he could congratulate himself and his colleagues very sincerely on enjoying the privilege of having Mr. Cash as their Chairman.

The Chairman then proposed, and Sir Daniel Goddard seconded the re-appointment as a Director of Mr. E. Honoratus Lloyd, K.C. The Chairman apologized for the absence of Mr. Lloyd, who he said was a very valuable member of the Board, and a regular attendant at the meetings.

Moved by Mr. Webb, and seconded by Mr. Hitchcock, the meeting re-elected as an Auditor Mr. F. G. Barrett.

Lieut.-Col. Woodall's Connection with the Company.

The Chairman said this concluded the formal business; but he would like to propose a hearty vote of thanks to the Engineer and General Manager, to Mr. Moon under him, and to all the staff, including the workpeople. He had already said something about Lieut.-Col. Woodall, and he could say a great deal more. The proprietors had often been told what an extremely able officer he was, and what he had done for the Company. On this occasion, as on others, he could assure them that the officers had had a difficult and strenuous half year; and they had done their very best, which had meant a successful half year, having regard to all the circumstances of the case. Therefore it was not merely a formal vote of thanks that the meeting was asked to give.

Mr. R. H. Glen, F.C.A., seconded the vote, which was cordially passed.

Lieut.-Col. H. W. Woodall, C.I.E., returning thanks on behalf of the staff and workmen, said these votes were highly appreciated, just because it was felt that they were not merely formal. It was a great pleasure to them all to serve under a Board of Directors of whom they had always been proud, and never prouder than they were to-day. There had been two instances that day (which they would remember, and which would be a great comfort to them) in statements made by Directors. The Chairman had pointed out the position in regard to the manufacture of gas, which was a position that all chairmen did not understand. He had said that it was now not only a question of make of gas per ton. The operations were very much more involved. As they were working to-day, instead of the coal gas being enriched by the water gas, the coal gas was bearing a pretty heavy burden in having to bring the water gas (which was practically no longer carburetted) up to the value which they had to give the consumer; and as the price of oil went up, this was going to be a more and more serious position. It was also a great pleasure to hear Sir Daniel Goddard's remarks in regard to repairs and maintenance, because all of them on the works realized how important this was. The strain to get down to the last 1d. or ½d. per 1000 c.ft. in maintenance meant very often the loss of a degree of efficiency that was hardly appreciated; and when a Director got up and spoke as Sir Daniel Goddard had done, it was a great comfort to people who had to try and run efficiently a big works like theirs. The Chairman had referred to the fact that they had already established a Profit-Sharing Committee. He was very glad that this works committee had been formed while he was still Engineer. One had a certain amount of knowledge to-day of what these Committees were going to be; and he believed they were going to perform a wonderful service. At Bournemouth the happiest relations had always existed between Directors, staff, and workpeople; and these relations he was confident had been distinctly strengthened during the few months that the Profit-Sharing Committee had been in existence. They were the most delightful meetings; and they enabled the Directors and staff to indicate to the workpeople the difficulties that faced them. The meetings also enabled them more than ever to appreciate the hardships possibly—or at any rate the difficulties—with which the workmen of the Company themselves were faced. He would like to take this opportunity of saying how very well, in his opinion, the Company were served by the present staff and workpeople. Mr. Moon during the very difficult times of the war—much more difficult than any which he (the speaker) had had to face—served the Company with great distinction. He had made a name already in the gas industry which undoubtedly would be enhanced as he had greater opportunities of showing his value. With the workpeople it was just the same; and he (the speaker) did not believe that any Company got more assistance in practical suggestions with regard to the working operations than they did. He could honestly say that not a week passed without his getting suggestions from the workpeople themselves, many of which proved to be very valuable. So far as he himself personally was concerned, he found it difficult to reply to the kind things that the Chairman had said. One did not give up a position such as his, after holding it for nearly twenty years, without considerable thought. These years had been very happy ones to him; and one of the pleasantest things to him that day was to know that among the very best of friends he had were included the staff and workmen at Bournemouth. The Board had always extended to him the greatest sympathy and consideration; and he was very sorry indeed this would

be the last time that, as General Manager, he would have an opportunity of thanking them for this sympathy and consideration. It was, however, a great consolation to feel that he would retain his association with the Company as Consulting Engineer. Once again he thanked the Chairman, Directors, staff, and workpeople at Bournemouth for the very happy time they had made the years he spent among them.

The meeting was brought to a close with a vote of thanks to the Chairman and Directors, on the proposition of Mr. BARRETT, seconded by Mr. WEBB.

MANCHESTER GAS-WORKS EXTENSIONS.

Application to Borrow £1,000,000.

An application of the Manchester Corporation to borrow £1,000,000 for the purpose of carrying out extensions at the Bradford Road Gas-Works, and other necessary work, with the object of increasing the daily output of gas from the undertaking from 26 to 34 million c.ft., was the subject of an inquiry held by Mr. C. H. Roberts, an Inspector of the Ministry of Health, at the Town Hall, last Tuesday.

Mr. P. M. Heath (the Deputy Town Clerk) said the present plant was not equal to the demands; and it was only through the tolerance of the public in submitting to reduced pressure, and by a measure of relief obtained during the war by lighting restrictions, that they had been able to carry on. It was almost unnecessary to say that, in these circumstances, they had received a large number of complaints from people who did not understand exactly what the position was; but it was only fair to the consumers to state that, when the position was explained to them, they accepted it. Manchester was the first Municipality outside London to have public lighting. In 1807, the first gas-lamp was lighted by the Commissioners who at that time governed Manchester and Salford. Ten years later gas was in more general use, and was then sold at 14s. per 1000 c.ft. Now the price was in the neighbourhood of 3s.

Alderman W. Kay (the Chairman of the Gas Committee) said he believed that, if it had not been for the war, the Manchester gas undertaking would have expanded by about 50 p.ct. The extensions were very urgently required. The dwelling-houses of the future would make great use of gas appliances. The sum of £100,000 was required for gas-cookers, the demand for which was far from being satisfied. The proposals had received the unanimous support of the Council.

There was no opposition.

THE RECENT STRIKE AT THE NORTH MIDDLESEX GAS COMPANY'S WORKS.

[COMMUNICATED.]

The history of the recent "lightning" strike at the works at Mill Hill of the North Middlesex Gas Company is of very great interest, and full of instruction for those who are watching the present attitude of union labour—more especially for such as are engaged in the production of gas and similar essential products. It serves as an excellent example of the activities of revolutionary extremists; while it is also a clear proof that such methods can be successfully met and defeated. The matter in dispute was the employment of non-union men. Discontent was more or less apparent some months ago; and so, in order to define the attitude of the Company, the following notice was posted on the premises:

> The works of this Company are free; and no worker therein, whether male or female, is under any compulsion to join or abstain from joining any trade union.

Last month, the union men (National Union of General Workers) demanded the withdrawal of this notice, and consequently of the policy indicated. The Company conferred with the Ministry of Labour, who discussed the position with the leaders of the union concerned; and the leaders instructed the local branch that they were not to strike on this issue. In spite, however, of this decision of their appointed leaders, the men delivered a verbal ultimatum, which was received by the Company at 8 a.m. on Saturday, Jan. 31. It was to the effect that, unless the non-union men were dismissed, the rest would come out. This referred to six men only—all old servants of the Company. The demand for such injustice was, of course, refused; and the union men "downed tools" at 10 a.m. on the same day.

The Company were thus faced with the imminent failure of the gas supply, and damage to plant by thus throwing it out of action. Nothing was done towards "carrying on" until the last man had left the yard, as it was hoped that at the eleventh hour moderate counsels would prevail; neither had any preparations been made in anticipation. As a preliminary the following notice was posted in the affected districts:

> The union employees at Mill Hill demand that a few of the Company's oldest servants who have not joined the union shall be forced to do so or be dismissed from the Company's service. The Company, recognizing the freedom of the subject, say: "No, this coercion shall not be."
>
> Volunteers have been obtained; but more are wanted to keep the works going until fresh skilled labour is available.
>
> If you can assist to fight for the right, please call and offer your services at the works, Mill Hill.

The first step taken was to reduce the district pressures. In the retort-house, the Works Foreman took over the charging machine, and the Works Manager the telpher; and they, with volunteers from the clerical staff, carried on with the charging of the retorts. The Junior Chemist later on worked the telpher quite efficiently, after little more than an hour's tuition from the Manager. Under the same guidance, other members of the clerical staff clinkered the water-gas generator, and had the plant working by 4 o'clock the same day. Similar assistance was given at the engine-room and boilers, under the supervision of the Works Fitter; and by Sunday morning the holders were very nearly full. This method of working continued over the week-end; and early the following week, owing to the steady influx of new labour, the continued efforts of the staff, and assistance of volunteer helpers, the district pressures were restored to normal. By the end of the week, the works were re-manned throughout with a most satisfactory class of men.

GAINSBOROUGH GAS UNDERTAKING.

Report by Mr. J. H. Brearley, M.Inst.C.E.

Four months ago, Mr. J. H. Brearley was called in to inspect the gas works of the Gainsborough Urban District Council, and to report on what might be done to bring the concern up to present-day requirements, with the probable cost of the work. Subsequently he had an interview with the Gas Committee; and the scope of the reference was enlarged to include an examination of the wages paid and the staff employed to carry on the work of the undertaking. Mr. Brearley's report has been before the Gas Committee on several occasions, but up to the present no action has been taken on it.

Mr. Brearley's inspection of the works, he said, showed that the producing capacity in the two retort-houses was 556,000 c.ft. per day; and after allowing 20 p.ct. for marginal stand-by, there was an excess over the maximum demand of 61 p.ct. The retort-houses were spacious, and from the workmen's standpoint compared very favourably with hand-charged installations in works of similar magnitude. Luted lids were used. There were two boilers externally fired, and fitted with Wilton's furnaces. A water-softening plant was provided. Exhaust steam was utilized to raise the temperature of the feed water. The boilers, for their type, were operated economically, but were too small, and not so suitable as boilers with self-contained fire-boxes. The condensers were 50 p.ct. above present requirements. The two exhausters—15,000 and 5000 c.ft. per hour respectively—were old machines, but kept in excellent order. The scrubber he would have regarded as inadequate; but the excellent result of selling 34·8 gallons of 5° Twaddel liquor per ton of coal showed that it was doing its work very well indeed. The manager had divided it into two sections; one part being worked with clean water, and the other with weak liquor which was being worked-up to sale strength. There were four purifiers, stage-floored. It would have been more economical at a works of this size if they had been at the ground level; but the designer had probably in view the need for space for treating the purifying materials. Lime was used for purification. The cost of purification in the last account year was £581, which averaged £15 per change. Oxide of iron would be far more economical.

There were two gasholders, affording a total capacity of 260,000 c.ft. The increased popularity of gas for other purposes than lighting had resulted in greater equalization in the demands for gas; and the incidence of a dark or foggy day did not make that percentage of difference to the output which it did formerly. Although it used to be an axiom that the storage should equal the maximum day's output, and Gainsborough was rather less than this, he regarded it as sufficient Gasholders were expensive to instal and costly in upkeep. If water-gas manufacture were adopted, however, it would be necessary to establish a gasholder for water-gas storage, or set one of the existing ones apart for the purpose. The station meter was of unknown age and make. The works mains were ample in size. No gauges were provided to indicate pressure, except at the exhauster. The yard space was limited, and the lay-out of the works far from ideal, with an inevitable adverse result on the wages bill. The coke-stores were not well placed, and the coal-stores inconvenient and inadequate. The offices were not well arranged, and were too cramped. The workshops were fair. There was no laboratory or equipment for making chemical tests such as one would expect on a works of this magnitude. Generally, the district mains were adequate.

Turning to working results, Mr. Brearley said that in the last financial year 7754 tons of coal were used. The make of gas was 10,629 c.ft. per ton, of which 9507 c.ft. were sold. The leakage was 9·66 p.ct. The coke sold was 9·5 cwt., tar 13 gallons, and liquor 34·8 gallons per ton of coal carbonized. With the exception of the gas made and sold, he regarded these results as thoroughly satisfactory. During the last six years the make per ton had been 11,442, 11,387, 10,515, 10,628, 10,769, and 10,629 c.ft. Taking the first and highest at 100, the ratios only showed a variation of 8·09 p.ct. This was probably accounted for by excess inert matter and the difficulty of getting skilled and willing retort-house labour. Many works had succeeded in maintaining, and even increasing, the make per ton, but only at the sacrifice of something in the quality produced. The quality of the gas supplied at Gainsborough was considerably higher than is usually the case elsewhere. The leakage was rather high; but as the accuracy of the station meter registration was in doubt, no safe deductions could be made from the figures.

During the twelve months ended March 31, 1919, the wages paid amounted to 12s. 0·57d. per ton of coal, of which 8s. 7·78d. represented wages on works. There was substantial scope here for more economical methods of manufacture, and an incentive to spend a considerable amount in capital to reduce the burden of labour costs—a burden which would be considerably higher in the current year. He did not think the management was at fault, as the works were badly arranged for labour-saving. The salaries paid could certainly not be considered excessive. Indeed, they all seemed low for current conditions. The manager's salary had not kept pace with the alteration in values, and was considerably below what is regarded as a fair rate for the head of an undertaking with a capital of over £100,000. It would be noted that there was no technical assistant.

The present adversity of the undertaking was due to circumstances for which the manager could not be held responsible. The records showed that, notwithstanding the high capital, the gas was produced and sold at a reasonable price up to the outbreak of the war, prior to which the present Manager (Mr. J. Baldwin) had served the under-

taking for thirteen years. The dates when advances had been made in the price of gas showed that the Council had been very dilatory in making the price fit the cost of manufacture. In 1914 the price to ordinary consumers was 3s. 4d. per 1000 c.ft., less 10 p.ct. discount. In July, 1915, discounts were abolished. In April, 1916, the price was raised to 3s. 9d.; and again in July, 1917, to 4s. Not until January, 1919, was it once more altered, and then to 4s. 8d. In July it was raised to 5s., and in August, 1919, to 7s. Mr. Brearley compared these advances with the advances made in the price of coal, and with the balances at the credit of the appropriation account. Whereas on March 31, 1914, this amounted to £8906, by the end of 1918-19 it was reduced to £2541. This reduction was to be greatly deplored, especially as the works depended entirely upon manual labour. Proceeding to deal with a subsidiary reference as to what could be done to improve the results from the present plant, Mr. Brearley said that with improved heats the make of gas might be raised to 11,500 c.ft.; but it would not greatly affect the finances. Substantial economy would be effected by changing to oxide purification. The station meter should be tested and examined internally. More systematic testing of the mains in the district and the consumers' meters should be introduced.

The only satisfactory way of substantially improving results was by a judicious modernization of the works. The most economical production could not be achieved by continuing to supply gas of the present high quality. The plant should be so modified that it would be possible to produce and sell any quality down to 450 B.Th.U., or even less. The various ways in which this could be accomplished were explained. He recommended the installation forthwith of a water-gas plant—preferably of the carburetted type—of 250,000 c.ft. per day capacity, together with two Lancashire boilers, at an approximate cost of £6000. When completed this plant would allow them to reduce the quality to 500 B.Th.U., which he recommended. The boilers would be sufficiently large to serve whatever modernization of the carbonizing plant was decided upon; and this plant would enable them to "carry on" with the aid of No. 1 retort-house while No. 2 retort-house was being reconstructed. For the time being the smaller gasholder could be set aside for storing water gas; but ultimately it would be necessary to consider enlarging the storage. Having got the water-gas plant at work, he would then recommend the installation of an additional exhauster of 25,000 c.ft. per hour capacity, at a cost of £560, and a washer-scrubber of 500,000 c.ft. per day capacity, at a cost of £950. Also two purifiers to act as catch-boxes, at an approximate cost of £3000, with provision for increasing to four boxes. It would probably be necessary to instal a new station meter, at a cost of £1500. While these alterations were in process of completion the reconstruction of the carbonizing plant could be thoroughly considered. At the time of the report, they might take it that a continuous vertical retort installation of 500,000 c.ft. capacity would cost complete approximately £28,000, or an intermittent type £25,500. Alternative to these the cost of installing machines in No. 2 retort-house was submitted for consideration, and estimates of the cost furnished.

Mr. Brearley strongly advocated the provision of a well-equipped chemical laboratory, and the appointment of an official capable of making all necessary tests. Gas was becoming more and more a scientific process; and it was obvious they could not engage in processes involving important chemical reactions—such as water-gas making—without proper scientific control. He enumerated the duties upon which a chemical assistant might usefully be engaged. A calorimeter should also be obtained immediately; and as soon as the standard recording calorimeter had been prescribed, this should be secured also. Though a sulphate of ammonia plant would be costly to instal at the present time, the price obtained for liquor was so low that the desirability of doing this should be examined at an early date.

The assessment for rates was £1837; and Mr. Brearley thought a proper valuation would probably show they were appreciably over-assessed. He advocated as good policy the acquirement of property adjoining the present works, which would give greater facility for adapting the works to mechanical carbonization. Mr. Brearley also mentioned the possibility of obtaining coke-oven gas; but the nearest ovens he found to be several miles away.

He closed his report by expressing appreciation of the ready manner in which Mr. Baldwin had furnished him with the figures and information which he required.

REORGANIZATION OF THE DEVIZES GAS-WORKS.

What was practically an unopposed inquiry has been held at Devizes, by Mr. P. M. Crosthwaite, on behalf of the Ministry of Health; sanction being sought by the Corporation to the borrowing of £14,000 (subsequently increased to £17,000), for reconstruction work and extensions in connection with the gas undertaking. The following is taken from a lengthy account of the proceedings prepared for the "Wiltshire Gazette."

The TOWN CLERK (Mr. J. T. Jackson) said the present works were started at the beginning of the last century. They were model little works; and no doubt at the time, like so many model works, they served their purpose. But no room was allowed for extension; and so great difficulty was experienced from time to time. The evil day was put off as long as possible, with the result that it was only by the manager being up at all times, night as well as day, helping with the stoking himself, and practically doing anything, that the town had been supplied with gas at different periods during the winter.

Mr. W. J. RENDELL BAKER (the Engineer and Manager) said he took charge of the works in October, 1916, and found them working up to more than their full capacity. There was a general increase in the demand for gas; and the works were not equal to it. For the ten months of the current financial year—from April to January—the increased make of gas was 16·7 p.ct. In September, November, and December it was over 22 p.ct. increase compared with the corresponding periods of the year before. As the works stood to-day, the utmost capacity was about 200,000 c.ft. per diem. Last winter on many nights the stock of gas came down to 5000 c.ft. at 10 o'clock at night. They had got as low as 2000 c.ft. The Corporation had submitted the whole of the proposals to Mr. W. Doig Gibb. The Committee decided not to go on with the gasholder part of Mr. Doig Gibb's report, but to adopt all the rest. They were doing work out of revenue to the extent of £4000. Mr. Baker went on to refer to the increased amount of loans which would probably be required, owing to the advance in prices—from £14,000 to £17,000; and he put in a schedule showing the works proposed to be executed under the loan, and the cost, as follows:

Reconstruction of retorts, installation of mechanical stokers	£11,875
Duplicate engine and dynamo	854
Booster and steam governor	350
Two main governors	210
Pipes, valves, connections to steam-engines and dynamos, booster, governors, &c.	200
Reconstruction of retort-house, breaker-pit, foundations for engines, dynamos, booster governors—estimated to cost	2,000
	£15,489
Estimated credit for old materials	100
	£15,389
Contingencies 10 p.ct.	1,538
	£16,927

Mr. SALMON (who said he was a member of the Gas Committee now, but was not at the time when the scheme was agreed to) remarked that the cost would be a serious thing for the town. There would be an increased charge upon the works of £2000 a year; and Mr. Baker hoped to save £1000. How was it proposed to meet the other £1000?

The TOWN CLERK: On the price of gas.

The INSPECTOR: You will have to pay for it somehow. Do people want the gas? That is the point. If the cost of the works is going to be £2000 a year, I think you are in a lucky position if you can save half the amount by the economies which will be effected on the working of the undertaking.

Mr. BAKER said he did not admit that the demand for gas was anything like exhausted. If Devizes had to find £1000 a year extra, it would only mean 6d. per 1000 c.ft. on the gas.

Mr. FRED. CHIVERS (the Chairman of the Gas Committee): In any case we should have to spend £2000 or £3000 to put new retorts in. Mechanical stokers ought to have been put in ten years ago.

The inquiry was then closed.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 23.

All tar products continue in strong demand, and prices are firm. For pitch, makers' idea is over 110s. per ton net in bulk at makers' works. Creosote is between 9d. and 10d. per gallon. Pure benzol and pure toluol are about 3s. per gallon. Solvent naphtha, 95-160, is about 3s. 6d. to 3s. 9d. per gallon. There is a considerable call for all forms of naphthalene, and values are firmer. Crude carbolic acid, 60's, is about 3s. 6d. per gallon net and naked.

In sulphate of ammonia the position is unchanged. All available supplies are readily taken up.

Tar Products in the Provinces.

Feb. 23.

The average values for gas-works products during the week were: Gas-works coal tar, 64s. 9d. to 69s. 9d. Pitch, East Coast, 105s. to 107s. 6d. per ton f.a.s.; West Coast—Manchester, 95s. to 100s.; Liverpool, 95s. to 100s.; Clyde, 105s. to 107s. 6d. nominal. Benzol 90 p.ct., North, 2s. 3d. to 2s. 4d.; crude 65 p.ct. at 120° C., 1s. 5d. to 1s. 7d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 2d. to 2s. 4d. Toluol, naked, North, 2s. 5d. to 2s. 6d. nominal. Coal tar crude naphtha in bulk, North, 10d. to 10½d. Solvent naphtha, naked, North, 3s. 3d. to 3s. 4d. Heavy naphtha, North, 3s. 2d. to 3s. 3d. Creosote, in bulk, North, liquid, 8½d. to 9d.; salty, 7d. to 7½d. Heavy oils, in bulk, North, 8½d. to 9d. Carbolic acid, 60 p.ct., 3s. 3d. to 3s. 6d. Naphthalene, £18 to £22; salts, £6 10s. to £7 10s., bags included. Anthracene, "A" quality, 7½d. to 8d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

There has been no material alteration in conditions since last report, unless it is that prices still continue in an upward direction. Pitch keeps firm, and a further advance has taken place in most districts. Stocks are being drawn upon to meet current requirements, but are still of fair proportions. Nevertheless, no fall in values is looked for during the next two or three months. South Wales buyers are paying very high rates for spot parcels. High prices will naturally be paid for briquettes so long as coal remains dear. Altogether, while such high prices are obtained for coal sold abroad, the value of pitch is hardly likely to decline. Crude tar is higher, and prepared tars are much wanted. Carbolic acids meet fair inquiry; but it is impossible to say how long the market will continue on present lines. The demand for creosote is insistent, and it is difficult to fix a limit for the advance. Up to 10d. per gallon is now reported paid; but whether at this price creosote is not rather an expensive fuel is a matter for careful consideration. Solvent naphtha is firmer, and tends to a higher range of values. Naphthalenes are steady, and also inclined to advance. Benzol is much wanted for motoring fuel; and it is reported that

makers could readily obtain a further 3d. per gallon advance. Toluol is without alteration. Intermediates are scarce, and prices generally are advancing. Licences for the export of all coal-tar products, excluding finished dyestuffs but including aniline oil and salts, granted prior to Jan. 1 are revoked as from Saturday last; but applications for renewals of any such licences will be considered if special cause can be shown.

Latest quotations are as follows:

Benzol: 90% London 2s. 4d. to 2s. 5d., North 2s. 3d. to 2s. 4d.; 50-90% 2s. 2d. to 2s. 3d. London, 2s. 1d. to 2s. 2d. North; crude 60-65%, 1s. 5d. to 1s. 7d.; pure, 3s. per gallon naked.

Crude Tar: London, 62s. 6d. to 67s. 6d.; Midlands, 58s. to 65s.; North, 57s. to 62s. 6d. per ton *ex* works. Refined tar, 42s. per barrel (free) on rail.

Pitch: London, 110s. per ton; East Coast, 102s. 6d. to 107s. 6d. per ton; West Coast, 100s. to 110s., with Manchester 102s. 6d. per ton, and Glasgow 105s. per ton; South Wales, 115s. per ton.

Solvent Naphtha: London, 3s. 6d. Provinces average 3s. 4d. per gallon.

Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 2s. 10d. per gallon.

Naphthalene: Refined, £23 per ton nominal; crude, £7 to £10 10s., according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 3s.

Creosote: London, 9½d.; North, 8½d. to 9d.; heavy oil, 8d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 7d. to 1s. 8d. per lb., drums free.

Cresylic Acid: 95%, 3s. to 3s. 3d.; 97-99%, 3s. 3d. to 3s. 6d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 3s. 6d. per gallon; crystals 40%, 1s. 2d. to 1s. 3d. per lb.

Sulphate of Ammonia.

Demand appears to be improving again, and practically the entire production for the present seems to be required for home agricultural purposes. The farmer realizes that he is well looked after at present prices, and will take all the cheap fertilizer he can get; certainly nitrate of soda at £24 10s. per ton does not interest him with sulphate of ammonia at £3 per ton less. Production in this country has increased even since the armistice, and manufacturers are making plans to secure the better marketing of the greatly increasing output. It is possible there may shortly be some surplus for export; but it will not be much. Export value is about £27 to £30 per ton.

Extension at the Bury Gas-Works.—The Gas Committee of the Bury Corporation have received the sanction of the Ministry of Health for the borrowing of £43,350 for the installation of vertical retorts at the gas-works.

Manchester and Municipal Collieries.

At a meeting of the Manchester City Council last Wednesday, Mr. R. J. Davies moved that they should set up a Committee of Inquiry to consider the advisability of (*a*) establishing a Central Coal Purchasing Department, and (*b*) purchasing their own sources of supply. He said the Corporation were such large consumers of coal that they could run at least three first-class collieries, and employ 3000 men. During the last financial year, the Corporation consumed 694,565 tons of coal, and paid £830,295 for it, or an average price of 23s. 11d. per ton. It would have been much better if the municipalities had owned their own sources of supply, rather than these supplies being in the hands of merchants, adventurers, and exploiters. The Manchester Corporation had not always received the class of coal they contracted for; the quality being so bad that on one occasion the stokers at the baths refused to use it under the boilers. The tendency of the times was municipalization and nationalization; and when the Corporation owned their coal supplies, they would have solved one of the greatest problems they had to deal with. Mr. J. E. Sutton, who seconded the proposal, urged that the present method of buying coal was haphazard. The resolution was carried by 44 votes to 31.

Chesterfield's New Water-Gas Plant.—The Chesterfield Gas and Water Board have decided to purchase a new water-gas plant, capable of producing 500,000 c.ft. of gas per day; and it is intended to use this to supplement the output of the present plant, as well as to have it available in the event of a breakdown. The Board have resolved to sign the agreement to employ disabled men to the extent of 5 p.ct. of manual workers.

Gas Explosion at Willenhall.—Considerable damage was caused to the modern lock factory of Messrs. H. & T. Vaughan, Ltd., at Willenhall, by an explosion which occurred last Wednesday morning in the varnishing department. By some means, it is thought, one of the pilot-lights to the gas-stoves must have become extinguished on Tuesday evening, with the result that there was an accumulation of gas in the stove. On Wednesday morning one of the employees went to attend to the stoves, when there was an explosion, which wrecked the stoves. Fortunately, out of between 700 and 800 employees only fifteen were slightly and one seriously injured.

Matlock and District Gas Company.—In their annual report, the Directors state that the difficulties of gas undertakings have increased during the year, and have added to the anxieties in carrying on the business of the Company. The capital is £58,412 paid up; and the income from the sale of gas for the year was £16,989, and from residuals £6467. There was a profit on the working of £4171; and to this has to be added the balance brought forward, making the total credit £9416. The Company have made a reduction of 2d. per 1000 c.ft. in the price of gas; and the Directors recommend a dividend of 4s. 6d. per £10 share, making 4½ p.ct. for the year, less tax. This will leave a carry-forward of £6291.

USE Simmance's

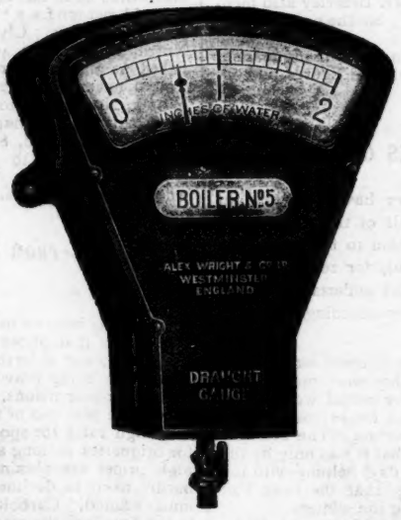
DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.



Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

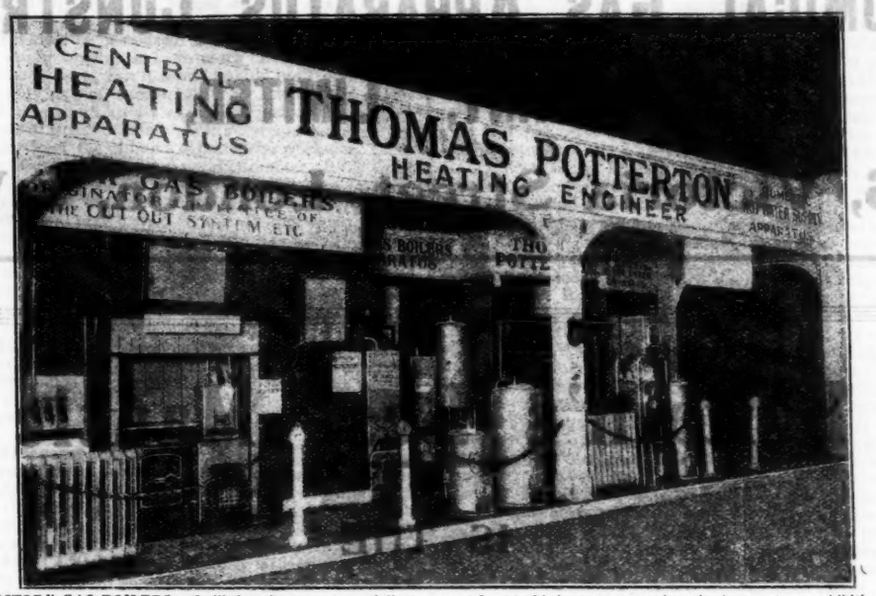
ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

"Ideal Home" Exhibition, Olympia.

STAND No. 96 GROUND FLOOR.

Special Exhibit of Hot Water Supply and Heating Apparatus.



Potterton's "VICTOR" GAS BOILERS and allied equipment are specially represented upon this important occasion, the first post-war exhibition of the original "Ideal Home" Series, organized by the "Daily Mail."
WORKING EXHIBIT demonstrating to the general public the advantages and economy afforded by properly designed hot water supply and heating apparatus.
A cordial invite is extended to all Engineers and Gas Companies' representatives.

THOMAS POTTERTON, BALHAM, LONDON, S.W. 12.

No. 15M.

THE BEST LAMP

for outdoor lighting is

The BLANLITE

No. 15 M.

High Power, Low Pressure.

Fitted with Expansion Chamber
for use with
Intermediate Mantles.

Each Lamp fitted with *one control for gas and air. Made in polished copper* 20 S.W.G.

Write for Particulars.

THE BLAND LIGHT SYNDICATE, LIMITED

63 QUEEN VICTORIA STREET, LONDON, E.C. (4 doors from the Mansion House Station).
6, BARNFIELD, URMSTON, MANCHESTER.

Telegrams { "BLANLITE, CANNON, LONDON."
"BLANLITE, URMSTON, MANCHESTER."

Telephones { London: Central 5647 (3 lines).
Manchester: Urmston 216.

WATER GAS PLANT.

ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,

36, Victoria Street, London, S.W.

Britain's Best Mantle

IS THE

VOLKER

The All-British Production of an All-British Company

The VOLKER LIGHTING CORPORATION, Ld.
Garratt Lane, LONDON, S.W. 18.

CARLESS, CAPEL & LEONARD,

HOPE CHEMICAL WORKS, HACKNEY WICK, LONDON, N.E

And at PHAROS WORKS, HACKNEY WICK.

NAPHTHA AND GASOLINE DISTILLERS AND PETROLEUM IMPORTERS,

Specially distil Carburine Spirit, Specific gravity ·680, or of any other grade suitable for Enriching Gas, also Gas Oil best adapted for injecting into the Retorts, as in the Herring Process.

Importers of Petroleum for Carburetting Water Gas, or for Manufacturing Oil Gas. Distillers of Pentane, Petroleum Ether, and Naphtha for clearing the pipes of Naphthalene, &c.

Samples and Prices may be had on application.

Chester United Gas Company.

At the half-yearly meeting of the Company yesterday [Monday], it was reported that the balance of profit was £6330, and that there had been an increase in the quantity of gas sold of 9·8 p.ct. The Directors recommended the payment of the maximum dividend of 5 p.ct. for the year. The Chairman (Sir John M. Frost, J.P.) referred to the promised gas legislation, and went on to say that, in spite of restrictions arising from rationing, and difficulties inseparable from the conditions prevailing during the past few years, the gas industry was still developing. Development naturally involved, sooner or later, the issue of new capital; and it was apparent that more liberal terms in regard to the issue of new capital must be provided. The proposed new method of charging for gas might involve a little more clerical work, and be somewhat confusing at first; but it would enable the Company to manufacture and supply gas of such quality as scientific research might, from time to time, find to be most economical and advantageous in the interests of the consumers. With the return during the past year of the majority of the old and experienced workmen, there had been a distinct improvement in the general character of the work performed; and the Company were also able to commence a resumption of the inspection and overhaul of fittings and appliances in general use. There had been many very trying periods during which, under imperative instructions from the Board of Trade, the Company had had to reduce the quality of the gas; and these variations had not only caused temporary inconvenience to the consumers, but had also disorganized the distribution system, by a serious detrimental effect on meters and service-pipes. They were, however, gradually remedying these defects; and he hoped that they had passed through the worst of their difficulties, and would very soon be able to resume and enlarge upon the pre-war practice of affording consumers every reasonable assistance in the maintenance of burners, fires, and cookers in an efficient condition, and in the supply of gas of a regular steady quality suited to their requirements.

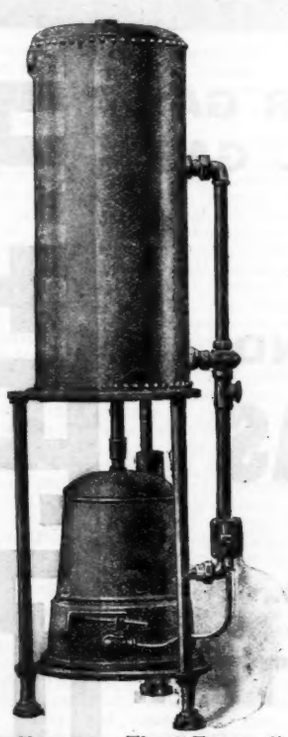
Glasgow and the Disposal of Sulphate of Ammonia.—The Glasgow Corporation Gas Committee have had before them a draft agreement with the British Sulphate of Ammonia Federation, appointing them exclusive agents for the sale of the Corporation's entire output of sulphate of ammonia until May, 1930, subject to the right of either party to determine such agency in either May, 1922, or May, 1926, on giving the appropriate notice. The standard of quality is fixed at 24½ p.ct. of ammonia, until the Federation in general meeting shall alter same. The quantity of sulphate of ammonia estimated to be produced and disposed of at the four chemical works of the Corporation during the next financial year is, approximately, 10,000 tons, the value of which at current market prices is £210,000. The Sub-Committee agreed to recommend that, with the view of obtaining fuller information in reference to the matter, the Corporation should be represented at a meeting to be held last week in London, when the whole of the proposals were to be reviewed.

An Anxious Year at Bristol.

Submitting the accounts for the past year at the meeting of the Bristol Gas Company, Mr. James H. Howell (the Chairman), said he wished, on behalf of his colleagues and himself, to express their deep regret at the loss the Company had sustained in the death of Mr. John Phillips, who for nearly sixty years was associated with the undertaking, from the time when he was a junior clerk till he became Secretary, and finally a Director. He was a devoted servant of the Company; and his death was deplored by all. He had been succeeded by Sir Percy K. Stothert, who was not only an expert in the gas industry, but was also by family ties connected with the Company—his father having been a Director, and his cousin Deputy-Chairman until his death. His presence on the Board would be of great value to the Company. In common with all gas undertakings in the kingdom, the Bristol Gas Company had had a very anxious and troublous time during the past year. The difficulty in obtaining adequate supplies of suitable coal had been insurmountable. The vagaries of the successive Coal Controllers had added difficulty to difficulty for the management. Numerous visits to London had been necessary by the Deputy-Chairman, the Secretary, and the Engineer, to obtain enough coal for requirements; and in spite of their efforts, the quantity received had been barely adequate, while the quality at times had been so bad that even as much as 30 p.ct. of ash had been in it; and the railway carriage for a large portion from so far north as Durham had added greatly to the cost. The present stock was so low, and the prospect of supplies so unpromising, that the Board were very apprehensive of the consequences. Thanks were due to the Secretary (Mr. S. E. Halliwell) and the Engineer (Mr. R. Robertson) who had really overworked themselves, to the Works Superintendents, and to all the officials, who had not spared themselves, and to whom the success of the Company in these trying times was due. The cost of all machinery and materials necessary for the up-keep and renewal of the works and mains had increased enormously since 1914—ranging from 235 p.ct. on iron and steel, 240 p.ct. on lime, 130 p.ct. on cement, 70 to 400 p.ct. on timber (according to the description), 200 p.ct. on tools, 120 p.ct. on brass goods, 135 p.ct. on lead and compo. pipe, 160 p.ct. on main pipes, 200 p.ct. on oils and paints, 220 p.ct. on fire-clay and fire-bricks, and so on; and the tendency, apparently, was still upwards. In dealing with the accounts, he must draw their attention to the immense advances in coal, oil, and labour, which would convince the proprietors that the increased charge for gas in the last quarter of the year was more than justified. By careful management on the part of the responsible officials and the staff generally, the Company had, in spite of all difficulties, just earned the statutory dividend of 5 p.ct. Sir G. E. Davies seconded the adoption of the report and accounts, which was agreed to.

The Wellingborough Gas Light Company, Ltd., report an increase in the sale of gas during the past half year of nearly 14 p.ct. over the corresponding period of 1918.

We are exhibiting at the British Industries Fair, Birmingham, Feb. 23rd to Mar. 5th. Stands Nos. 74/75. Shall we see you there?



No. 424. The "Energy."
Stands can be supplied to any desired height.

The "Main" Circulating Water Heater.

THIS Gas Heater is constructed throughout of strong cast iron with corrugated inner and outer jackets giving an unprecedented heating surface. The gases, after heating the inner jacket, are drawn to the base, and to reach the flue outlet must travel over the outer casing, thus utilising the heat to the utmost.

A really efficient thermostat is fitted; and the heat-retaining outside casing is made of steel, porcelain enamelled, giving the heater a most attractive appearance.

A sample will convince you of its efficiency.

R. & A. MAIN, LTD.

WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 6, Narrow Wine Street, BRISTOL; 333, Queen Street, MELBOURNE.

Less Gas Consumed at Sheffield.

The Directors of the Sheffield Gas Company report that the total quantity of gas sold during the past year was 4,885,972,000 c.ft., being a decrease of 6·17 p.ct. on the previous year. This was the natural outcome of the cessation of hostilities, as Sheffield, being a large industrial centre, and taking such a prominent part in the production of munitions, a drop in the use of gas for manufacturing purposes was to be expected. During the last two months of the year the demand showed a large percentage increase—from 10 to as much as 30 p.ct. in a week—and this is still being maintained, with every prospect of its being so in the future. Owing to the increase of 6s. per ton on coal from July, and also the extra cost of material and labour, the Directors were compelled to raise the price of gas from 3s. 3d. to 4s. per 1000 c.ft., on Aug. 1. This entails a reduction of the dividend on the Class B stock to 4 p.ct., and on the Class C stock to 3½ p.ct. per annum; and the Directors obtain no fees. An interim dividend was paid for the half year ended June 30; and after providing for the dividend for the December six months, there will remain a balance on the year's working of £5745, to be added to the amount carried forward from previous accounts. Under the provisions of the Coal (Pit's Mouth) Prices Order and Direction, 1919, affecting domestic consumers, a rebate of 7d. per 1000 c.ft. has been announced.

Cleveland Gas Company.—The Directors report that the profit made during the half year ended Dec. 31 was £395, to which was added £954 brought forward, making a total credit balance of £1349. A dividend of 2½ p.ct. is recommended. This will absorb £498; and the balance of £851 will be carried forward. The Directors express regret that, owing to the high cost of coal, labour, and materials, the results have not been more satisfactory, and add that until a reduction takes place in these items (more especially that of coal), the profits are bound to be on a reduced scale.

Position of the Drogheda Gas Undertaking.—When gas workers' applications for increased wages came before the Drogheda Corporation last week, the Mayor (Alderman Monahan) pointed out that the newly-elected Council had come into office only to find a condition of bankruptcy; for the rates struck last year did not cover the expenditure, and they were now carrying on by favour of the bank. In the gas-works they had a similar state of things. Any week the bank might refuse to pay the wages bill. The works were being run at a loss, and a rate would have to be struck to cover the loss. They could not at present increase the price of gas, as they had reached the maximum; but permission would have to be secured from the Local Government Board to enable them to make an increase. Even if they got permission, there remained the fact that capital expenditure would be needed to put the works in order, and a loan would have to be procured. He asked the gas-workers not to press their demands until March. After some discussion, the whole question was remitted to a special meeting of the Council.

Nottingham Gas Undertaking.

In the course of the Government inquiry in progress at Nottingham in relation to the Corporation scheme for a wide extension of the municipal boundaries, much has been made of the dependence upon the city authorities for gas supply by the townships proposed to be annexed. In illustration of excellent management of the Corporation trading concerns, a point was made that towards the total profit of £2,000,000 which had accrued during the last twenty years, no less than £997,173 had been contributed by the gas undertaking. Mr. Arthur Collins (the City Treasurer of Birmingham), who had been responsible for an exhaustive analysis of the accounts, stated that the undertakings of the Nottingham Corporation presented a record second to none in regard to all the cases he had investigated for annexation purposes. He instanced especially the gas undertaking as being run upon excellent and economical lines; pointing out that everything which could be borne by revenue was being so dealt with. It was not often, he observed, that one found an undertaking such as this raising no loans within the past ten years, when the city had been developing all the time. The debt outstanding was only £883,000, and the capital outlay nearly £500,000 more. The value of the undertaking to-day must, he considered, be several times more than the whole of the loan debt outstanding on it. The present price of gas, 4s. 6d. per 1000 c.ft., was about the middle of the scale of charges applicable in the country. In other words, he thought that profits were not being made by "bleeding" the consumers by high prices, but by careful management. The productive undertakings of the Nottingham Corporation cost a little over £4,000,000, and they would realize to-day, as a commercial venture, more than the whole of the outstanding debt of the Corporation, which was only £4,500,000, because their post-war value was three or four times their pre-war cost. The reserve funds in hand upon the various undertakings represented by gas supply and other Corporation services amounted to £620,000.

Protest against an Increase in Price.—Consumers at Chirk (Denbighshire) have decided to lodge a protest against the action of the Gas Company in raising the price from 7s. to 10s. per 1000 c.ft. If the Company refuse to make any concession, the consumers will support a recommendation by the Rural District Council to the Parish Council to instal electric lighting plant.

Canterbury Gas and Water Company.—It was reported at the annual meeting of the Company yesterday that the sales of gas showed an increase of a million c.ft. Two increases in the price of gas were necessary during the year, making the present basis charge 5s. 6d. per 1000 c.ft. An Order under the Temporary Increase of Charges Act has been secured, which will enable the Company, at the present price charged for gas, to pay a dividend not exceeding 6 p.ct. per annum; and this was the rate which the Directors recommended. Mr. Henry Hart, who has been a Director for 54 years, has been compelled to retire, owing to advancing years.

"PIONEERS" OF BLUE WATER GAS
FOR "JOINT USE" WITH COAL GAS.
DEMPSTER'S COMBINATION OF
C-W-G- AND
BLUE WATER GAS
APPARATUS "IS NECESSARY."
R. & J. DEMPSTER, LTD.,
MANCHESTER.
London Office:
CONNAUGHT MANSIONS,
34, VICTORIA STREET, S.W. 1.
London Office Telephone No. Vic. 7426.

Improvement at Tralee.—It was intimated at a meeting of the Tralee Urban District Council that no objection had been received to the proposal to obtain permission to increase the price of gas from 6s. 8d. to 8s. 4d. per 1000 c.ft. The quality of the gas supplied has greatly improved under Mr. W. Buckley's management.

Oil Production in England.—Sir John Cadman, Professor of Mining (Dean of the Faculty of Science at the University of Birmingham), takes an optimistic view of the future of Great Britain as an oil-producing country. Speaking at the dinner of the Birmingham University Mining Society, he said he did not know whether people realized how largely this country was dependent for oil upon foreign supplies. He thought the veil about to lift. With regard to home oil, he would almost go so far as to say that success was assured. Drilling in this country was undertaken as the result of scientific reasoning; and the first borehole yielded oil. It has been clearly demonstrated that oil does exist in this country; and all that has to be done is to find the necessary structure to get oil in commercial quantities. He emphasized the close connection which there would have to be in future between the oil and coal industries.

Rossendale Union Gas Company.—The Directors of the Rossendale Union Gas Company, in their half-yearly report, state that the sales of gas show an increase of 5¾ p.ct. as compared with the corresponding period of the previous year. The profit for the six months was £5938. The Directors recommend dividends of 10 p.ct. on the original, new ordinary, and preferred ordinary shares, 7½ p.ct. on the 1876 shares, 7 p.ct. on the amendment act and new amendment act shares, and 5 p.ct. on the new preference shares. The total capital expenditure to date is £181,783.

Clonmel Gas Undertaking.—At a meeting of the Clonmel Gas Committee, the Mayor, in proposing the re-election of Alderman D. F. O'Connor, as Chairman, paid a high tribute to the manner in which that gentleman had conducted the business of the Committee, and to the ability with which he had safeguarded the interests of the undertaking during the crisis through which they had been passing. His Worship coupled with his complimentary remarks the name of Mr. Richard Kneeshaw, Gas Manager, and said the Committee were fully satisfied with his services, and greatly appreciated the way in which he had carried out his duties.

STOCK MARKET REPORT.

THERE was not much, if any, perceptible improvement in the general tone which pervaded the Stock Exchange last week; and it would be hard to point to a really bright spot. Indeed, in some quarters things were worse than they had been the week before.

The gilt-edged market furnished an instance. In Home Government securities there was persistent selling of the 5 p.ct. War Loan until on Friday it actually changed hands at the record price of 89⅝. The other leading issues were much less affected; the last day's prices being: Consols 49⅞-50¼, War Loan 89⅝-90, Funding 72-72⅝, Victory 82⅜-82⅞. Bonds were easier at the close. Colonials and Indians were fair. Home Rails began promisingly, and lasted two or three days. Sellers then began realizing profits, and the advance was stayed. Canadians were not strong; but the demand for Argentines was fully maintained.

The Foreign Market was brighter. A welcome rally in the Exchange promoted French Loans, and various South American issues were in demand.

In the Miscellaneous Market, the flood of new concerns is still pouring in. Rubbers, Textiles, and Nitrates were in good favour. Oils, however, were irregular.

Business in the Gas Market showed little variation in point of recorded transactions from the run of the week before; but a welcome feature was furnished by the improvement in tone. This was conspicuous in the London Companies; the ordinary stocks of Gas Light and Coke and South Metropolitan advancing 3 each. The former changed hands at 60, and the latter at 59½. In Continentals, Imperial was better, and the quotation was advanced 1. In the remoter world, Monte Video rose 2.

Bargains done for cash during the week were as follows: On Monday, European 9⅜, Gas Light ordinary 55¼, 55½, 56, 56½, 57, ditto maximum 38, ditto preference 60, Imperial Continental 134, 134½, 135, 136, 136⅛, 137, Primitiva 32s., San Paulo 7½, South Metropolitan 55½, 56. On Tuesday, Bombay 5¼, Gas Light ordinary 55⅜, 56, 56¼, 57, 58⅜, ditto maximum 38, ditto debenture 50, Imperial Continental 137, 138, 138⅜, Monte Video 74, 74⅜, Primitiva 32s. 6d., 33s., River Plate debenture 48½, South Metropolitan 57, South Suburban 68, 68½, 69½. On Wednesday, Gas Light ordinary 57, 57¼, 57½, 57⅜, ditto maximum 38, ditto preference 59, ditto debenture 51, Imperial Continental 137½, South Metropolitan 57, 57½, 58, 59, ditto debenture 50, South Suburban 68. On Thursday, Brentford "A" 45½, British 25, 25¼, 25½, Gas Light ordinary 57½, 58½, ditto maximum 38¾, ditto preference 59, Ilford debenture 63, Imperial Continental 137½, 138, Monte Video 75½, Primitiva 31s. 3d., 32s. 6d., 32s 9d., South Metropolitan 59, 59½. On Friday, Cape Town 7 1/16, Commercial 4 p.ct. 56, European 9½, Gas Light ordinary 58, 58½, 58¾, 59, 59½, 60, Ilford debenture 62, Imperial Continental 137, 137¼, 137½, Monte Video 75¼, Primitiva 31s. 3d., ditto preference 65s., South Metropolitan 57½, 58, 59¼, 59½, Tottenham "B" 50½, 52⅜.

In the Money Market, the position for the first half of the week was quite easy; but later it hardened materially under apprehension of dearer money, and closed very firm. The Bank rate is 6 p.ct., as fixed on Nov. 6, 1919.

The Metrogas Musical Society [South Metropolitan Gas Company] will give a performance of Gounod's "Redemption" at Southwork Cathedral next Saturday, Feb. 28, at 3 o'clock. No tickets will be required.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share	When last Dividend.	Ante-War Dividend & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
183,049	Stk.	July 31	4	4%	Aldershot 4 p.c. Pref.	..	60—65	..
1,561,888	,,	Sept. 26	2½	2⅞%	Alliance & Dublin Ord.	69—84	43—48	..
874,300	,,	Jan. 15	4	4%	Do. 4 p.c. Deb.	76—79	61—63	..
280,000	5	Oct. 30	7½	8%	Bombay, Ltd.	5⅞—6⅜	5—5½	5½
50,000	10	Aug. 28	16	10% †	Bourne-mouth Gas and Water { 10 p.c.	25—30	19—20	..
888,110	10	,,	7	7%	B 7 p.c.	15—15½	10—11	..
115,000	10	,,	6	6/-	Pref. 6 p.c.	13¼—14	9½—9⅞	..
162,065	—	Dec. 30	—	4%	4 p.c. Deb.	..	64—66	..
993,046	Stk.	Feb. 12	14	30/- †	Brentford A Consolid.	281—286	48—53*	45½
784,933	,,	,,	11	26/8 †	Do. B New	204—209	43—48*	..
85,000	,,	,,	5	6%	Do. 5 p.c. Pref.	109—111	74—76*	..
221,400	,,	Dec. 11	4	4%	Do. 4 p.c. Deb.	91—93	84—86	..
214,775	,,	Sept. 11	11	7½%	Brighton & Hove Orig.	208—218	123—128	..
944,300	,,	,,	8	6⅔%	Do. A Ord. Stk.	154—159	84—89	..
1,287,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
680,000	20	Sept. 26	12½	10%	British	44—45	25—27	25—25½
120,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	61—63	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	47—50	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1¼—2¼	6⅞—7½	7 1/16
100 000	10	Oct. 30	—	4½%	Do. 4½ p.c. Pref.	4—5	6¼—7	..
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	58—63	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,613,380	,,	Aug 14	5⅞/4	83 4	Commercial 4 p.c. Stk.	106—108	56—61	56
560,000	,,	,,	6¼	26/8	Do. 3½ p.c. do.	108—105	61—66	..
478,800	,,	Dec. 11	8	8%	Do. 5 p.c. Deb. Stk.	69½—71½	49—51	..
800,396	,,	,,	4	—	Continental Union Ltd.	76—79	27—32	..
900,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—60	..
51,600	Stk.	Aug. 28	14½	10½% †	Croydon A 10 p.c.	..	135—145	..
878,400	—	,,	11½	7½% †	Croydon B and C 7 p.c.	..	95—105	..
493,270	Stk.	,,	6	5⅞%	Derby Con. Stk.	128—126	..	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	..	..
1,002,180	10	Jan. 29	10	6/0	European, Ltd.	17½—18	9½—10½	9½—9⅝
16,298,975	Stk.	Feb. 12	4/17/4	80/-	Gas Light and Coke { 4 p.c. Ord.	98—102	57—60*	55½—60
2,600,000	,,	,,	8½	26/8	3½ p.c. max.	76—79	34—43*	38—39⅜
4,062,295	,,	,,	4	4%	4 p.c. Con. Pref.	96—99	59—62*	59—60
4,674,850	,,	Dec. 11	8	8%	5 p.c. Con. Deb.	72½—74½	50—52	50—51
130,000	,,	,,	10	10%	10 p.c. Bonds	..	..	..
82,500	,,	Sept. 11	5	4⅜%	Hastings & St. L. 5 p.c.	..	57—62	..
958,740	,,	,,	8½	2⅞%	Do. 3½ p.c	37—39	40—45	..
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	16½—16¾	8¾—9¾	..
86,600	Stk.	Aug. 28	9	8⅛%	Hornsey 7 p.c.	..	90—95	..
181,800	,,	Sept. 11	7½	6⅞%	Ilford A and C.	131—134	88—98	..
65,780	,,	,,	6⅔	4⅛%	Do. B	115—118	67—73	..
65,500	,,	Dec. 30	4	4%	Do. 4 p.c. Deb.	92—94	59—63	62—63
4,949,000	,,	May 14	9	4½%	Imperial Continental	156—160	135—140	134—138½
1,285,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	85—90*	..
205,243	,,	Sept. 11	6½	6½%	Lea Bridge Ord. 6 p.c.	119—121	86—91	..
2,498,995	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. { A	211—213	..	..
806,088	,,	June 26	4	4%		146—149	..	..
165,786	,,	Aug. 14	7/6/6	8⅓%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
76,000	5	June 11	5	5%	Maidstone 5 p.c.	..	56—61	..
250,000	100	Oct. 1	4½	4½%	Malta & Mediterranean Met. of Melbourne { 4½ p.c. Deb.	4½—4¾	1½—2½	..
541,920	Stk.	Nov. 27	4	5%	Monte Video, Ltd.	98—101	90—97	..
1,875,892	,,	July 30	4½	3⅜%	Newcastle&Gateh'd Con.	11½—13	72—77	74—75½
529,785	,,	Dec. 30	5½	5⅛%	Do. 5½ p.c. Deb.	98—99½	66—67	..
15,000	10	Sept. 11	—	11%	North Middlesex 10 p.c.	69—68	56—57	..
55,940	10	,,	7/14/0	7%	,, ,, 7 p.c.	..	13½—13⅞	..
600,000	Stk.	Nov. 27	8	8%	Oriental, Ltd.	14—15	9—9½	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	117—119	102—105	..
60,000	50	Aug. 28	15	7½%	Porteus, Island B	72—73	42—52	..
100,000	50	,,	12	6⅔%	Do. C	128—131	68—73	..
249,980	5	April 29	8	—	Primitiva Ord.	118—121	65—60	..
499,950	5	June 26	5	—	Do. 6 p.c. Pref.	5½—6	14—2	31/8—33/-
621,500	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	4½—5	82—83	65/-
600,000	Stk.	Jan. 29	4	4%	Do. ,, ,, 1911	91—98	70—72	..
846,198	,,	Dec. 30	4	4%	River Plate 4 p.c. Deb.	..	48—51	..
150,000	10	Sept. 26	6	6/-	San Paulo { 6 p.c. Pref.	85—87	47—50	48½
125,000	50	Dec. 30	5	5%	5 p.c. Deb.	10½—11	7½—8	7½
195,000	Stk.	Aug. 28	10	8%	Sheffield A	47—49	39—41	..
909,984	,,	,,	10	8%	Do. B	238—234	75—80	..
528,600	,,	,,	10	4⅛%	Do. C	232—294	75—80	..
183,301	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	230—233	75—80	..
90,000	10	Oct. 15	9	10%	South African	..	..	..
6,609,895	Stk.	Feb. 12	5/4/0	80/-	South Met. 4 p.c. Ord.	18½—11½	12—13	..
250,000	,,	Jan. 15	—	5%	Do. Pref.	111—113	57—60*	55½—59½
1,695,445	,,	,,	3	3⅜%	Do. 3 p.c. Deb.	..	93—95	..
234,920	,,	Aug. 14	5½	5%	South Shields Con. Stk.	73½—74½	50—53	50
1,087,795	,,	,,	6	5⅞%	S'th Suburb'n Ord. 5 p.c.	167—169	105—107	..
247,558	Stk.	Dec. 30	5	5%	Do. 5 p.c. Deb. Stk.	114—116	68—73	68—69½
647,740	,,	Nov. 13	7½	8⅛%	Southampton Ord.	116—118	78—83	..
121,275	,,	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	99—102	61—63	..
120,000	,,	Aug. 14	—	3⅜% †	Tottenham District { A 5 p.c.	..	61—63	..
782,275	,,	,,	6	2⅝% †	B 3½ p.c.	135—138	70—75	..
181,355	,,	Dec. 11	4	4%	4 p.c. Deb.	115—117	60—65	60½—62½
189,880	10	Dec. 30	5	—	Tuscan, Ltd.	87—89	63—65	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	5—6	1—2	..
926,476	Stk.	Sept. 26	5	3⅛%	Tynemouth 5 p.c. max.	93—95	45—50	..
80,000	,,	Aug. 28	8½	55/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	108½—109	74—76	..
255,536	,,	,,	6½	40/-	Do. B 3½ p.c.	151—156	85—90	..
108,075	,,	,,	—	38/6	Do. C	129—134	63—68	..
140,865	,,	,,	—	38/6	New Ordinary	..	63—68	..
852,000	,,	,,	6½	38.9	Wimbledon 5 p.c.	..	68—68	..
95,000	,,	,,	6⅔	40/-	Epsom 5 p.c.	117—122	65—70	..
88,416	,,	Dec. 30	5	5%	5 p.c. Deb. Stk.	121—125	65—70	..
						88—89	48—50	..

* Ex Div. † Next dividend will be at this rate.

Gas Price and Costs at Hastings.

Gas consumers at Hastings and St. Leonards are kept well posted, through the medium of the advertisement columns of the local Press, with regard to the financial problems of the Gas Company. The latest of these announcements issued by Mr. C. F. Botley (the Engineer and General Manager) states that, in accordance with the Coal (Pit's Mouth) Prices Order and Direction, 1919, a reduction of 10s. per ton is being allowed in respect to certain coal supplied to the Company. This allowance (less authorized expenses or contingencies) has in due course to be handed over to household or domestic consumers in the form of a rebate, which has been fixed for the current quarter at 7d. per 1000 c.ft. of gas consumed. It will be understood that in this matter the Company are simply acting as agents of the Government in carrying out the official instructions. No further increase in the normal price of gas is at present necessary; the results of the past half year, chiefly because of the increased sale of gas, having proved better than anticipated. Consumers are, however, particularly requested to note that since Jan. 1 the revenue of the undertaking has had to bear additional costs (*inter alia*) as follows: Coal.—Railway rates and charges have been increased, and the higher cost of freightage continues. In the past half year the average cost of coal was 48s. 10d. per ton; while for the month of January the corresponding figure was 53s. 3d. Oil.—As from March next an increase of 3d. per gallon, or 33 p.ct., has to be paid. Labour.—An award by the Court of Arbitration was recently announced in which the Company's employees have participated. This means another £2800 per annum, or (say) 1¾d. on the gas. Repairs and renewals.—Costs continue to increase, and material which should have been supplied during the last half year has yet to be delivered and paid for.

Glover-West Verticals at Coventry.—The Gas Committee of the Coventry Corporation are recommending that, in connection with the extension of the Foleshill Gas-Works, the Glover-West system of vertical retorts be installed; that a tender amounting to £159,664 be provisionally accepted; and that application be made to the Ministry of Health for sanction to a loan of the amount.

The Woodall-Duckham Vertical Retort and Ovens Construction Company.—A private Company has been registered, under the title of the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., with a capital of £175,000 in £1 shares—5000 10 p.ct. cumulative preference, 50,000 8 p.ct. cumulative preference, and 120,000 ordinary shares—to take over the business of a Company of similer name, which is about to be wound up.

Quality of Sheffield Gas.—The Sheffield Gas Consumers' Association have made their usual tests during January of the gas supplied by the Sheffield United Gas Light Company; and their inspector reports that an improvement in the calorific power was most noticeable in the latter half of the month. The pressure continues satisfactory, though some points are evidently affected by "boosters" attached to inadequate street-mains. There was a reduction in the non-combustible gases present, and some high percentages of oxygen were found.

Sir Henry E. F. Goold-Adams, the Chairman of the Munitions Invention and Nitrogen Products Committees (whose report, it may be remembered, emphasized the possibilities of obtaining valuable bye-products from coal when carbonized at a low temperature), has joined the Board of Low-Temperature Carbonization, Ltd.

The "Laws and Properties of Light" formed the subject of a lecture to the Herefordshire Photographic Society by Mr. T. Newton, Outdoor Superintendent to the Hereford Corporation Gas Department. Free use was made by him of the blackboard, supplemented by an excellent series of specially prepared diagrams. Mr. Newton said that light invariably travelled in straight lines, and at an enormous velocity—viz., 186,000 miles per second. The light of the sun flashed at a speed a million times faster than a cannon-ball in motion. He explained the methods of calculation of light, speed, and action, and how these could be mathematically checked and counter-checked so that scientists were left in no doubt as to the absolute accuracy of their conclusions. Very interesting were his demonstrations of refraction, diffraction, reflection, the production of the spectrum, and the action of various lenses in the transmission of light.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

UNDISPLAYED ADVERTISEMENTS: Situations Wanted, Six Lines and under (about 36 words) 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom	Advance Rate:	28/-	15/-	8/8
	Credit Rate:	32/-	16/-	9/6
Abroad (in the Postal Union) Payable in Advance		32/6	17/-	10/-

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON

FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE

PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO. LTD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C. 2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

MEWBURN, ELLIS, & CO,
CHARTERED PATENT AGENTS AND
TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C. 2.
Telegrams: "Patent, London." Phone 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

TULLY'S PATENT.
CARBURETTED HYDROGEN PLANT
for 300 to 500 B.Th.U.
COMPLETE GASIFICATION OF COAL.
BALE AND HARDY, LTD.,
89, VICTORIA STREET, LONDON, S.W. 1.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

BENZOL PLANTS FOR GAS-WORKS.
BAGLEY, MILLS, & CO., Ltd.,
92, Victoria Street, Westminster, S.W. 1, Invite inquiries from all Gas-Works making 75 million cubic feet and upwards per annum.

GEORGE WILSON
for
GAS-METERS, ORDINARIES, SLOTS, AND REPAIRS,
Foleshill Road, COVENTRY.
Telephone: 596. Telegrams: "GASMETER,"
and at
7/9, Grosvenor Street, Conm, MANCHESTER.
Telephone: 3214 CITY. Telegrams: "GASMETER."

SULPHURIC ACID.
SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENSER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD., Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1583 AVENUE (3 lines).

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6630.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

BRITISH GAS PURIFYING MATERIAL.
ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BRITISH GAS PURIFYING MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)
13, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmers Green 608.

INVENTIONS PATENTED. TRADE MARKS REGISTERED.
Advice and Handbook free. 35 years' references. Gas Patents a Speciality. KING'S PATENT AGENCY, Ltd. (Director, B. T. King, A.I.M.E., British and U.S. Regd. Patent Agent), 165, QUEEN VICTORIA STREET, LONDON, E.C. 4.

ROBERT DEMPSTER & SONS, Ltd., ELLAND, Gas Engineers and Contractors for CARBONIZING PLANTS on Horizontal or Vertical Principles, and Stoking Machinery. HANDLING INSTALLATIONS, including Coal Breaking, Elevating, Conveying Plants and Coke Screening, Storing and Telpherage Plants. PURIFICATION.—All Branches of Wet and Dry Purification. STORAGE.—Gasholders, and all forms of Gas Apparatus. Wire: "DEMPSTER, ELLAND." 'Phones: ELLAND 261, 262, 263.

"FERROX." "FERROX." "FERROX."

A BRITISH Oxide Cheaper and Better than Bog Ore. 35 per cent. Water, 75 per cent. Ferric Hydrate.

For Sale outright or on Loan.

OXIDE LIMITED, Brentford, MIDDLESEX.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.

See Illustrated Advertisement Feb. 17, p. 399.

ALDER AND MACKAY, LTD.
(ESTABLISHED 1850.)
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.

EDINBURGH.
(See p. 465.)

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.

We Guarantee promptness with efficiency for Repairs.

JOSEPH TAYLOR AND CO., CHEMICAL PLANT ENGINEERS, BOLTON, LANCS.

Telegrams—"SATURATORS, BOLTON," Telephone 0848.

BRITISH LUX. AN EXCELLENT PURIFYING MATERIAL.

Features:—

(a) Porosity equal to Best Bog Ore.
(b) Contains Ferric Hydrate in an active state, thus resembling "Lux."
(c) Prepared in good mechanical condition ready for Purifiers.

DANIEL MACFIE, 1, NORTH ST. ANDREW STREET, EDINBURGH.

NATIONAL ASSOCIATION OF TECHNICAL GAS OFFICIALS.

Head Office: 109, Exchange Buildings, Birmingham.

Full Particulars and Membership Forms may be obtained from the GENERAL SECRETARY.

APPOINTMENTS, &c., VACANT.

WHEN Filling Vacancies, please REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, has the FIRST CALL ON YOUR CONSIDERATION.

ADVERTISER wishes to come in touch with a GAS ENGINEER WITH ELECTRICAL KNOWLEDGE, with a view to Experimental Work on Improved Methods of Gas Heating, especially in the direction of a Heat Filter.

Address No. 6847, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

TOTTENHAM DISTRICT LIGHT, HEAT, AND POWER COMPANY.

SUPERINTENDENT.

WANTED, a Thoroughly Well-Trained Energetic WORKS SUPERINTENDENT for the Tottenham Gas-Works. Must be fully up to date in every Branch and Detail of the Work and Well Qualified to Exercise Control.

Salary, £700 per Annum. House, Coals, and Gas provided.

Applicants must state Age and Experience and Date when Service could Commence.

Copies of only two recent Testimonials should accompany Applications, which should be endorsed "Superintendent" and be addressed not later than March 4th, 1920, to

A. E. BROADBERRY,
Chief Engineer and General Manager.
639, High Road, Tottenham, N. 17.

CORPORATION OF CALCUTTA.

APPOINTMENT of Lighting Superintendent.

(a) Applications are invited for the post of LIGHTING SUPERINTENDENT, Calcutta. The Salary of the Appointment, inclusive of all allowances, is Rs. 750 rising to Rs. 1000 per Month by biennial increments of Rs. 50. The Corporation provide a Motor Car for the use of the Lighting Superintendent and his Staff, free of charge, for inspection work.

The appointment is subject to the Provident Fund, Leave and other Service Rules of the Corporation, and may be terminated at any time by Six Months' Notice on either side. The Provident Fund contribution is 6¼ p.ct. of the Monthly Salary, and an equivalent amount is contributed by the Corporation, and the fund accumulates at compound interest.

The Selected Candidate will be required to Devote his Whole Time to the Duties of his Office, and will not be allowed to take up any outside work. He must reside in Calcutta. He will be liable to Removal during the Term of his Office for Misconduct or Neglect of, or Incapacity for, his Duties. He will be required to submit to a Medical Examination before joining his Appointment. The Corporation will pay his passage (First class) from London to Calcutta; but he must refund the amount so paid if he gives notice within Two Years from the date of Taking Up his Appointment. He will be required to Take Up his Appointment about the 1st of August, 1920, and will receive half pay for the period occupied by his journey.

(b) There are about 12,000 Incandescent Gas Lights in the city, besides a number of Electric and Oil Lights. Gas and Electricity are supplied by public Companies. The Lighting Department of the Corporation are responsible for the Maintenance of Public Street Lamps and also of about 2300 Lights and 800 Electric Fans in Municipal Buildings. Candidates must have Experience of the Management and Control of the Lighting Department of a large town. They must have thorough and up-to-date knowledge of Mantles, Burners, &c., Photometric Work, Testing Pressure, and Determining the Discharging Capacity of Burner Nipples. They must also have a general knowledge of Electrical Work.

(c) Candidates should state their Age and Experience.

(d) Applications will be received by the Secretary to the Corporation of Calcutta, Central Municipal Office, Calcutta, up to 1st May, 1920.

J. C. MUKERJEA,
Secretary to the Corporation.
Jan. 28, 1920.

THE British Gas Light Company, Ltd., require an ENGINEER and MANAGER for their Trowbridge Station.

Commencing Salary, £400 per Annum, with House and other privileges.

Applications, stating Age, Qualifications, and Experience, and accompanied by *copies* of recent Testimonials, to be addressed to the Secretary, at the Chief Office of the Company, not later than Wednesday, the 3rd of March.

Chief Office, 11, George Yard,
Lombard Street, London, E.C. 3,
Feb. 16, 1920.

GAS-WORKS AND WATER-WORKS ENGINEER AND MANAGER.

THE Spalding Urban District Council require an ENGINEER and MANAGER for their Gas-Works and Water-Works at Spalding.

Experience with the Working of Vertical Retorts and with the Manufacture of Sulphate of Ammonia is essential.

Commencing Salary, £300 per Annum, with Residence.

Applications, to be accompanied by not more than three recent Testimonials, to be sent on or before the 5th of March next, addressed to the undersigned, and endorsed "Gas Manager."

Canvassing will be a Disqualification.

GEO. PANNELL,
Deputy Clerk.
Spalding,
Feb. 21, 1920.

COUNTY BOROUGH OF STOKE-ON-TRENT.

(GAS DEPARTMENT.)

THE Gas Committee require the services of a CHIEF DISTRIBUTION SUPERINTENDENT to Take Control, under the Chief Engineer, of the Distribution Department.

Applicants must be experienced in all up-to-date methods of Distribution, including High-Pressure Supply, and be capable of Advising Consumers in the use of Modern Gas Appliance.

It is preferred that Applicants shall have had Experience as Distribution Superintendents. Salary, £450 per Annum.

Applications, stating Age, Experience, accompanied by *copies* of three recent Testimonials, to be sent to the undersigned, endorsed "Chief Distribution Superintendent," on or before the 6th of March, 1920.

A. MACKAY,
Chief Engineer and General Manager.
Gas Offices, Longton,
Stoke-on-Trent.
Feb. 6, 1920.

THE Whitwood Chemical Company, Ltd., Normanton, require the Services of a GENERAL MANAGER at their Gas, Chemical, and By-Products Works.

Apply, by letter, stating Experience and Salary required, to No. 6850, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WORKING Manager required for Gas and Water Works in South Wales. Make of Gas, about 6 Millions, Hand Stoked. Mechanical Water filtration. Residence provided.

Apply, in writing, giving full Particulars, Wages required, and previous Experience, to No. 6848, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

COUNTY BOROUGH OF BARROW-IN-FURNESS.

(GAS DEPARTMENT.)

THE Corporation require the services of a CANVASSER to Inspect Consumers' Fittings, Advise as to their use, and Push the Sale of Gas.

Applicants must possess a thoroughly up-to-date knowledge of Heating and Lighting Appliances, both for Domestic and Industrial Purposes.

Further Particulars may be obtained on Application to the Gas and Water Manager, Gas-Works, Barrow-in-Furness.

Applications, stating Age and Experience, and accompanied by *copies* of three recent Testimonials, to be sent to the undersigned, endorsed "Canvasser," on or before Monday, the 1st of March.

By order,
L. HEWLETT,
Town Clerk.
Town Hall, Barrow-in-Furness.

ASSISTANT CHEMIST.

THE Directors of the Portsea Island Gas Light Company require the Services of a Competent ASSISTANT CHEMIST, capable of performing the usual Works Tests, trained in Calorimetry and in Gas, Coal, and General Chemical Analysis.

Applications, stating Age, Theoretical and Practical Training, and Salary required, to be accompanied by *copies* of not more than two recent Testimonials, to reach the undersigned on or before the 6th of March, 1920.

T. CARMICHAEL.
Gas Offices,
Town Hall Square,
Portsmouth.

WANTED—Well-Qualified Carbonizing FOREMAN for works of about 600,000,000 c.ft. Must be able to Take Entire Charge of Machine-Stoked Retort-House, including Regulation of Heats and Control of Men.

Applications, with *copies* of three recent testimonials, and stating Age, Experience, and Wages required, to No. 6851, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED — Draughtsman with Foundry and Gas Plant Construction Experience; also JUNIOR DRAUGHTSMAN for same office.

Apply, by letter, giving Experience, Salary required, &c., to No. 6852, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

FOREMAN Wanted for Meter Shop in North London District. Must be good all-round man.

Apply, stating Experience and Salary required, to No. 6849, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WEST'S Gas Improvement Company, Limited, Albion Iron-Works, Miles Platting, Manchester, require several SKILLED DRAUGHTSMEN for Structural and General Mechanical Engineering Work.

Apply, stating Age, Experience, Salary required, and when at liberty.

WANTED—A Good All-Round Fitter accustomed to Mains and Services and all Modern Appliances.

Apply, with References and Wages required, to the MANAGER, Gas-Works, RIPLEY, Derby.

PLANT, &c., FOR SALE & WANTED

THE Uxbridge Gas Company have for DISPOSAL, at their Eton Works:

Three Lengths of Steel HYDRAULIC MAIN "D" section, 18 in. by 18 in., 8 ft. 6 in. long, with 5 in. ASCENSION and DIP PIPES.
Belt-Driven EXHAUSTER (Gwyane & Beale), about 5000 c.ft. per hour.
Two 8 ft. square PURIFIERS, 14 in. Lute, with Lifting Apparatus.
Two 8 ft. Square Dry Lute PURIFIERS.

May be inspected at any time, and Offers to be sent to the MANAGER, GAS-WORKS, UXBRIDGE.

THE Newcastle-upon-Tyne and Gateshead GAS COMPANY have FOR DISPOSAL the under-mentioned FITTINGS for Thirteen Beds of Nine Retorts 22 in. by 15 in. by 20 ft. long:

234 Ω-shaped CAST-IRON MOUTHPIECES.
ASCENSION PIPES and BENDS.
BRIDGE and DIP PIPES.
HYDRAULIC MAINS, each 10 ft. 6 in. long.
12-in. FOUL MAIN.

The Benches are now being Dismantled, and the Fittings may be Inspected at the Redheugh Gas-Works, Gateshead-on-Tyne.

Further Particulars can be had on Application to the CHIEF ENGINEER, ELSWICK GAS-WORKS, NEWCASTLE-UPON-TYNE.

STATION Meters — Two for Sale, 12,000 and 10,000 c.ft. per Hour Capacity. Nearly New and Perfect.

FIRTH BLAKELEY, SONS, & CO., LTD., CHURCH FENTON, *via* LEEDS.